

A MANUAL OF EYEING

AND MEASURING

OF THE

CASES OF COLOR COMPANY

NEW YORK

1880

VOL. I.

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*Norman Singleton*

# A MANUAL OF DYEING

WITH THE DYESTUFFS

OF THE

CASSELLA COLOR COMPANY

NEW YORK

182 AND 184, FRONT STREET

VOL. II.

WOOL. SILK.

HALF-WOOL. HALF-SILK.

SECOND (ENLARGED) EDITION.

1913.

PUBLISHED BY THE CASSELLA COLOR COMPANY,  
NEW YORK.

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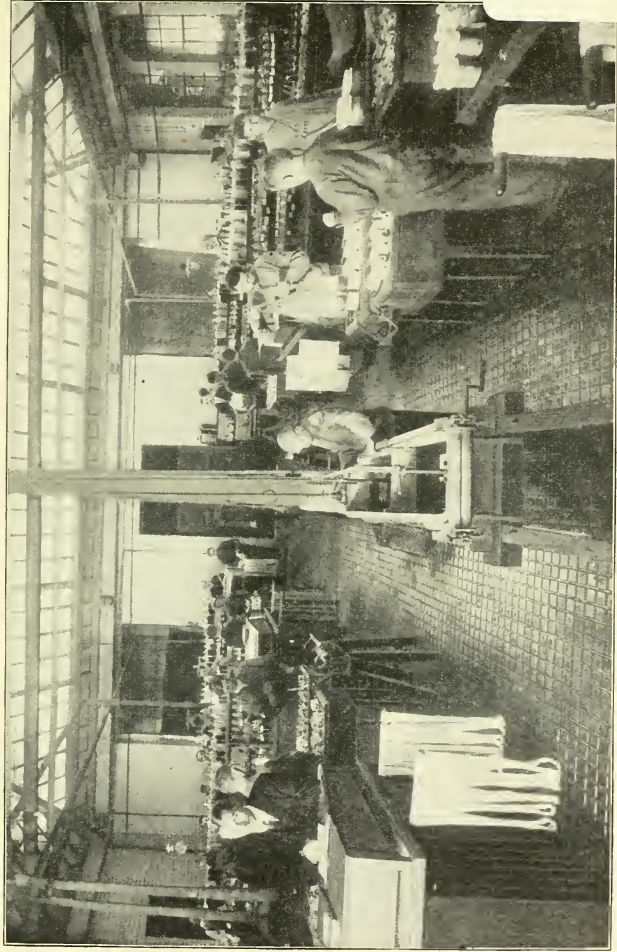
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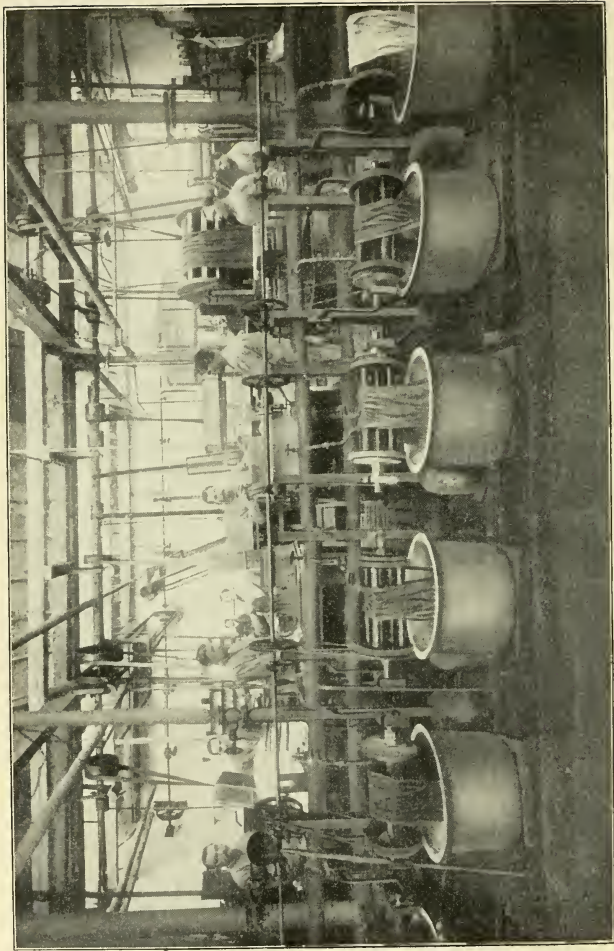


## Experimental Dye-House



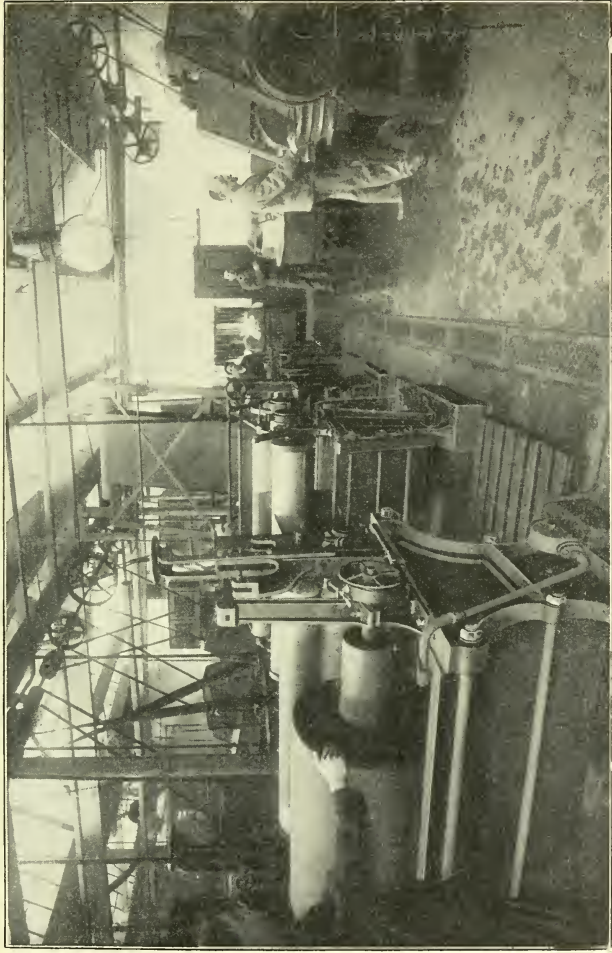
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## Experimental Dye-House



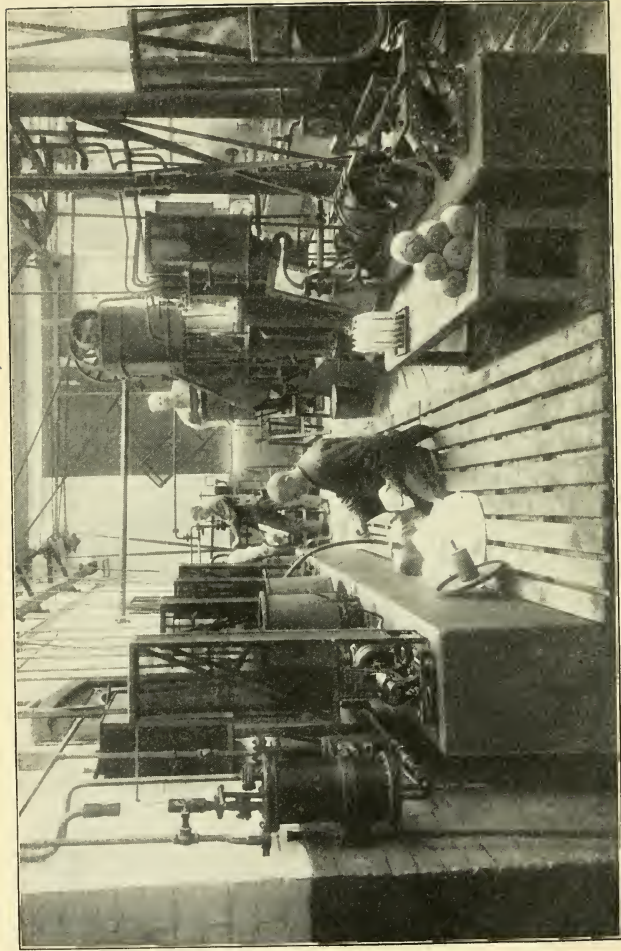
Second Main Section: Dyeing on a Large (Practical) Scale.

Experimental Dye-House



Third Main Section: Piece-Dyeing.

Experimental Dye-House



Fourth Main Section: Dyeing in Mechanical Apparatus.



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## PREFACE

TO THE FIRST EDITION.

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In compliance with a long felt want and frequently expressed desire, we have taken occasion to publish, as a supplement to our exhaustive works on "Cotton Dyeing", "Wool Dyeing" and "Union Dyeing" etc. issued by us during the last few years,

### A MANUAL OF DYEING

as a kind of handy book for the dye-house in pocket-book form giving particulars in a concise manner regarding the most important methods of dyeing.

The present Volume II deals with

THE DYEING OF WOOL, SILK, HALF-WOOL AND HALF-SILK.

In addition to the general methods of dyeing and a description of the special methods to be applied for the different classes of goods, we have included in this volume the much appreciated tabulations from our previous books indicating the dyestuffs and combinations thereof best adapted for producing the various shades. Great care has as usual been devoted to combining with comprehensiveness the greatest possible completeness.

We trust that this little volume will prove of equally good service in practice as our other publications have done hitherto.

NEW YORK, October 1908.

CASSELLA COLOR COMPANY.

# PREFACE

TO THE SECOND EDITION.

---

Owing to the recognition shown for the first edition of our

## MANUAL OF DYEING

issued a few years ago, which very soon became out of print, we feel that it is necessary to publish a new edition in an extended form.

With this present volume on the

## DYEING OF WOOL, SILK AND MIXED FIBRES

we are following up the new edition of Volume I (Cotton and Allied Fibres) issued by us in October 1911.

This volume is based on the same principles as the previous one, due attention being paid to improvements and new methods which have in the meantime been introduced.

We trust that this new edition will meet with a similar reception to that accorded to its predecessor, and that it will be equally appreciated.

NEW YORK, March 1913.

CASSELLA COLOR COMPANY.

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## WOOL DYEING.

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  6. Dyeing of Piece-Goods.
  7. Dyeing of Military and other Uniform Cloths.
  8. Dyeing of Wool and Fur Felt Hats.
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## DIRECTIONS FOR THE APPLICATION OF THE WOOL COLOURS.

### DISSOLVING THE DYESTUFFS.

For dissolving the dyestuffs, soft water free from lime, to best advantage condensed water, is used, as some dyestuffs form precipitates with the lime. Boiling condensed water is poured over the dyestuff previously mixed with some cold water, and the solution is then added to the dyebath through a fine sieve or a piece of cotton cloth. Any undissolved particles are then brought into solution by rinsing the filter with hot water.

*Anthracene Chrome Blue BW extra* and *RRW extra in Powder* and *Paste* are dissolved by mixing them with some ammonia (for powder about 500 parts, for paste about 50 parts per 1000 parts of dyestuff), after which some hot water is poured over them. *Anthracene Acid Blue RR* and *Chromate Blue Black B* are dissolved in water at a temperature of 50—60° (120—140° F.).

When dissolving *Basic Colours*, calcareous water should be corrected by adding some acetic acid. Basic Colours which are difficult to dissolve are best mixed with some acetic acid and dissolved by pouring hot water on them.

ACID COLOURS.

(Easily Levelling Colours).

Naphtol Yellow S, SL  
 China Yellow B  
 Acid Yellow AT  
 Fast Acid Yellow TL, 3G  
 Indian Yellow, G, FF, R  
 Metanil Yellow  
 Fast Yellow S  
 Tropaeoline O, OO, G  
 Orange GG, extra, II, IV, R  
 Azo Orseille BB  
 Lanafuchsine SG, SB, BBS, 6B  
 Brilliant Lanafuchsine GG,  
 Acid Magenta [SL, BB  
 Archil Substitute N Powder  
 Azo Wool Violet 7R, 4B  
 Azo Fast Violet 2R  
 Alizarine Cyanole Violet R  
 Acid Violet 6BS, 6BC, 4RS  
 Cyanole FF, extra, extra H,  
 AB, BSB, C  
 Alizarine Cyanole EF, B,  
 SR, SBR, SB, SG  
 Tetra Cyanole V, SF, extra,  
 Indigo Blue N, SGN [A  
 Thiocarmine R Powder  
 Azo Wool Blue SER, SE,  
 C, B, 6B  
 Azo Fast Blue B, B high conc.,  
 BD, BD conc. and high conc.,  
 BR conc. and high conc.  
 Azo Navy Blue B, 3B  
 Acid Navy Blue A, KP  
 Cyanole Navy Blue KR  
 Brilliant Naphtol Blue R, B,  
 Cyanole Green B, 6G, S [4B  
 Cyanole Fast Green G, V  
 Acid Green extra conc.,  
 extra conc. B, 5G, H,  
 liquid 5 times conc.  
 Fast Acid Green BN, B  
 Azo Merino Black SB, 6B,  
 6BE, 6BN, 3BN, B,  
 BE, BN.

Method I.

Charge the dyebath with

10% Glauber's salt crystals,  
 10% bisulphate of soda, and the dyestuff;

or with

20% Glauber's salt crystals  
 4% sulphuric acid, and the dyestuff;

enter the goods hot or even at the boil, and boil for 1 to 1¼ hours. In the case of deep shades and Blacks, a little bisulphate of soda or sulphuric acid may be added subsequently in order to effect a better exhaustion of the bath; a complete exhaustion is particularly of importance for piece-goods with vegetable fibre effects.

Goods hard to penetrate are entered at rather a lower temperature, the bath being then raised gradually to the boil; it is recommended also to somewhat increase the quantity of Glauber's salt.

In the case of non-neutralised, carbonised goods, the dyeing is commenced with Glauber's salt only, a little bisulphate of soda or acid being added later on if necessary.

The dyestuffs enumerated may be used straightaway for *subsequent shading* in a boiling bath; only in the case of very pale compound shades is it necessary to be more particular about selecting the most suitable dyestuff, for which purpose the following, which *level particularly well*, come first into consideration:

Cyanole FF, extra  
 Tetra Cyanole V  
 Cyanole Green B, 6G  
 Cyanole Fast Green G  
 Fast Acid Yellow 3G, TL  
 Orange GG  
 Azo Orseille BB.

The old baths are to advantage used over again, experience showing that the Acid Colours level more easily in old baths than in a fresh liquor.

The quantities of Glauber's salt and bisulphate of soda or acid required for the standing bath amount to about one-quarter of the original weight of Glauber's salt and about one-half of that of bisulphate of soda or acid.

## ACID COLOURS.

## Method II.

Orange EN, ENZ  
 Acid Brown  
 Brilliant Scarlet G, GG, R,  
     RR, 3R, 4R, 6R  
 Crystal Scarlet 6R  
 Scarlet FR, F2R, F3R, EC  
 Brilliant Cochineal 2R, 4R  
 Brilliant Croceine R, ROO,  
     B, BOO, M, MOO, 2B,  
     3B, 5B, 6B, 7B, 9B  
 Croceine AZ  
 Roccelline  
 Azo Rubine A, BB  
 Naphtol Red C, EB  
 Amaranth, B  
 Azo Red A  
 Bordeaux BL  
 Peri Wool Blue B, BG, G  
 Fast Navy Blue B, G  
 Water Blue B, RB, R  
 Pure Soluble Blue  
 Wool Blue TB  
 Navy Blue RSC  
 Fast Blue R, 3R  
 Induline B, 2B, 3B  
 Silver Grey N  
 Aniline Grey B, R  
 Nigrosine, soluble in Water  
 Naphtol Green B  
 Naphtylamine Black  
     ESN, ES3B, ES5B, ES8B,  
     EFF, HWN, S, SMT, SGG,  
     7B, 7BS, 4BS, SS2B, SS3B,  
     SOT, T, TV, TJ, TN  
 Naphtylamine Blue Black  
     5B, B  
 Naphtol Blue Black  
 Naphtol Blue Black BN, S,  
     SB, S2B  
 Naphtol Black B, 2B, 3B,  
     6B, M, SG, P, 4R.

The method of dyeing is on the whole the same as for the easily levelling colours mentioned on page 4 (Method I), but it is best to commence dyeing with only half the stated amount of bisulphate of soda or acid, and to add the remainder in several portions after boiling for  $\frac{1}{2}$  hour.

The dyeing is also frequently effected by adding the whole amount of acid together with 20% Glauber's salt straightaway to the bath, entering the goods at from 50—55° C. (120—130° F.), and raising to the boil in the course of  $\frac{3}{4}$  hour.

For *Peri Wool Blue* and *Fast Navy Blue*, charge the bath with

20—30% Glauber's salt crystals and  
 15% bisulphate of soda or  
 5—6% sulphuric acid

and the dyestuff; enter the goods handwarm, raise to the boil in the course of about an hour, and boil severely for  $1\frac{1}{4}$  to  $1\frac{1}{2}$  hours.

For *Black*, charge the bath with

10% Glauber's salt crystals,  
 10% bisulphate of soda, and the dyestuff,  
 or with  
 20% Glauber's salt crystals,  
 4% sulphuric acid, and the dyestuff.

Enter at about 60—70° C. (140—160° F.), raise in the course of about 20 minutes to boiling temperature, and after an hour's boiling, exhaust, if necessary, by adding a little bisulphate of soda or some acid.

When *shading* with the above-named Acid Colours, it is necessary to cool the bath off before adding them and then to bring again gradually to the boil. It is an advantage therefore to use the *easily levelling colours* indicated for Method I on page 4, adding them for subsequent shading straight to the boiling liquor.

ACID COLOURS.

Method III.

Charge the bath with

10% Glauber's salt crystals,  
2—5% acetic acid (according to the depth  
of the shade),  
and the dyestuff.

Enter the goods at 40—50° C. (105—120° F.),  
raise to the boil in 30 to 40 minutes, and  
exhaust the bath, after  $\frac{1}{2}$  to  $\frac{3}{4}$  hour's boiling,  
by gradually adding 3—5% acetic acid.

For piece-goods hard to penetrate, the  
amount of Glauber's salt is increased to 20—25%  
and the goods are entered at a lower tempe-  
rature.

*Rosazeine, Formyl Violet and Brilliant  
Milling Green* (the last two products parti-  
cularly in deep shades) are frequently also  
dyed according to Methods I and II, with  
bisulphate of soda and sulphuric acid respec-  
tively, particularly in the case of piece-goods.

*Lanacyl Blue, Lanacyl Navy Blue, Azo  
Merino Blue, Naphtol Blue and Lanacyl  
Violet* are to advantage dyed straightaway  
with the addition of the whole of the requisite  
acid (acetic acid). Charge the bath with

20% Glauber's salt crystals,  
10% acetic acid, and the dyestuff;

enter handwarm, raise to the boil in the course  
of  $\frac{3}{4}$  to 1 hour, and boil for about 1 hour,  
until the bath is exhausted. In the case of  
Lanacyl Navy Blue, Azo Merino Blue and  
Naphtol Blue, 5% bisulphate of soda are then  
further added, the boiling being continued for  
15 to 20 minutes in order to render the fixing  
complete.

Goods containing kemps, or other kinds of  
wool hard to penetrate, are boiled severely;  
the dyeing of kemps is promoted by adding  
subsequently some acid.

Carbonised material should before dyeing  
be thoroughly neutralised.

For the *subsequent shading* it is best to  
use the *easily levelling dyestuffs* indicated on  
page 4, which may be added straightaway to  
the boiling bath. If, however, the shading  
is done with dyestuffs from this group, the  
dyeing of which is commenced with acetic acid,  
the bath has to be cooled off first, and is  
brought again gradually to the boil after adding  
the dyestuff.

Milling Yellow O, OO, G  
Naphtaline Yellow Crystals  
Alphanol Brown B  
Milling Red G, FR, R  
Wool Red B, BG  
Rosazeine B  
Formyl Violet S4B, S5B,  
4BF, 6B, SB, 10B  
Alkaline Violet CA, C  
Formyl Blue B  
Brilliant Milling Blue B  
Brilliant Milling Green B  
Alizarine Brilliant Green G  
Naphtol Dark Green G  
Lanacyl Blue BB, BN, R, RN  
Lanacyl Navy Blue B, BB, 3B  
Lanacyl Violet B, BF  
Azo Merino Blue 3B, G  
Azo Merino Dark Blue R  
Naphtol Blue G, R;

further, combinations of

Naphtol Black  
3B, 6B

Naphtylamine Blue  
Black 5B

Naphtylamine Black  
ES8B, ES5B, ES3B,  
ESN, S, 7BS

with

Formyl Violet  
S4B, 4BF, 6B, 10B

Brilliant Milling  
Blue B

for cheap Navy and Dark Blues,  
principally on piece-goods

## ACID COLOURS.

## Method IV.

Charge the bath with

10% Glauber's salt crystals,  
5% acetic acid, and the dyestuff;

enter the goods at 60—70° C. (140—160° F.) raise in about 20 minutes to the boil, and after about  $\frac{3}{4}$  hour's boiling, add 5—10% bisulphate of soda or 2—2½% sulphuric acid in several portions, boiling for about 20 to 30 minutes, until the bath is thoroughly exhausted.

These Naphtylamine Blacks may also be dyed direct with bisulphate of soda or sulphuric acid, but the Black will come out slightly less bloomy than when dyed according to the above method. The dyeing is then carried out with the addition of

## Naphtylamine Black

„ 4B  
„ 4B high conc.  
„ 4BN  
„ 6B  
„ 6B high conc.  
„ 6BN  
„ X2B  
„ X2BV  
„ X3B  
„ OO  
„ D  
„ D high conc.  
„ BBT

10% Glauber's salt,  
5% bisulphate of soda or  
2% of sulphuric acid, and the dyestuff,

some bisulphate of soda or sulphuric acid being added after  $\frac{3}{4}$  hour's boiling in order to exhaust the bath.

For goods difficult to dye through, the amount of Glauber's salt to be added is increased to 20—25%, and the goods are entered at rather a lower temperature.

Carbonised goods should be neutralised before dyeing.

For *shading*, the following dyestuffs are used:

for	{	Acid Violet 6BS
Blue Black		Tetra Cyanole V
		Cyanole Green B, 6G
		Acid Green extra conc.
for	{	Acid Yellow AT
Jet Black		Indian Yellow FF
		Tropaeoline O, OO
		Orange II, extra.

For *subsequent shading* it is best to use the afore-mentioned shading dyestuffs which may be added straight to the boiling bath. If some Black has to be added subsequently, it is best to use Naphtylamine Black EFF or ESN, the liquor being cooled off previously.

ACID COLOURS.

Method V.

Charge the bath with

10% Glauber's salt crystals,  
5% acetic acid, and the dyestuff;

enter the goods at about 60° C. (140° F.), raise in 20 to 30 minutes to the boil, and exhaust the bath after  $\frac{3}{4}$  hour's boiling by gradually adding 2—4% acetic acid or bisulphate of soda.

In the case of goods difficult to dye through, the amount of Glauber's salt is increased to 20—25%, the goods being entered at rather a lower temperature. Carbonised goods should be well neutralised before dyeing.

In the case of goods which are to be steamed severely, it is an advantage to add 3% copper sulphate to the exhausted dyebath, and then work for another 20 minutes without steam; in such case the dyeing is carried out with the addition of acetic acid only.

For material which is somewhat alkaline (loose wool), it is advisable to add an increased quantity of acetic acid at the commencement of the dyeing.

For *shading*, the following dyestuffs are used:

for	{	Formyl Violet, all brands
Blue Black		Brilliant Milling Blue B
		Brilliant Milling Green B
for	{	Milling Yellow O
Jet Black		Tropaeoline O.

For *subsequent shading* with Alphanol Black, Anthracite Black or any of the shading dyestuffs mentioned above, the bath must be cooled off first, and, after adding the dyestuffs, be raised again gradually to the boil.

Alphanol Black B

„ BG  
„ 3B  
„ 3BN  
„ 3BN conc.  
„ KB  
„ KBB  
„ K4BN  
„ KSB  
„ KN  
„ KWAN conc.  
„ KV  
„ R

Anthracite Black B

„ R

ACID COLOURS.

Method VI.

Charge the bath with

1—2% oxalic acid (according to the hardness of the water),

5% acetic acid (for Dark Blue 2—3% acetic acid),

20% Glauber's salt cryst., and the dyestuff.

Enter the goods at 60—70° C. (140—160° F.), raise in 20 to 30 minutes to the boil, and after an hour's boiling exhaust the bath, if necessary, by adding some acetic acid. Then add

3% sulphate of copper,

and work for another ½ hour without boiling. Goods hard to penetrate, enter at a lower temperature, raising gradually to the boil.

The dyestuffs may also be dyed without copper sulphate but the resulting dyeings will only be moderately fast to steaming. In the case of *Naphtyl Blue Black FBB* the addition of oxalic acid may be omitted.

Several lots may be dyed consecutively in the same bath by cooling the liquor off and adding

¼—½% oxalic acid,

3% acetic acid (for Dark Blue 1—2%),

7% Glauber's salt cryst., and the dyestuff,

then boiling for about an hour, and exhausting, if necessary, with some acetic acid, adding

2½% sulphate of copper,

and working for another ½ hour without steam.

For *shading*, the following dyestuffs are used:

for Blue Black	{	Formyl Violet, all brands
		Brilliant Milling Blue B
		Lanacyl Blue BB, BN, R, RN
		Brilliant Milling Green B
for Jet Black	{	Milling Yellow O
		Fast Acid Yellow TL
		Tropaeoline O.

For the *subsequent shading* with *Naphtyl Blue Black*, *Naphtylamine Black* or the shading dyestuffs indicated (with the exception of Fast Acid Yellow TL and Tropaeoline O), the bath must be cooled off first, and then gradually brought again to the boil after adding the dyestuffs.

Regarding the application of *Naphtyl Blue Black* and *Naphtylamine Black* in combination with *logwood* and *sumac extract* see the "Dyeing of Piece-goods".

*Naphtyl Blue Black N*

„ NV

„ FBB

*Naphtylamine Black R*

„ RNB

„ NBB



ACID COLOURS.

Method VII.

Charge the bath with

10—20% Glauber's salt crystals,  
5% acetate of ammonia, and  
the dyestuff.

Enter the well scoured material at about 500° C. (1200° F.), raise in  $\frac{1}{2}$  to  $\frac{3}{4}$  hour to about 900° C. (1950° F.), and dye for 1 to  $1\frac{1}{4}$  hours at this temperature. The dyebaths exhaust well.

In the case of goods which are to be steamed severely, it is an advantage to add 3% sulphate of copper to the exhausted dyebath, and to work for another 20 to 30 minutes without steam, by which means the shade becomes deeper and duller.

It is of special importance to thoroughly scour the material, particularly yarns and piece-goods; carbonised goods should before the dyeing be completely neutralised, and subsequently rinsed thoroughly in plain water. In the case of dirty goods or of goods which are difficult to dye level, it is advisable at the commencement of the dyeing operation to add about  $\frac{1}{2}$ % bichrome to the bath in addition to the acetate of ammonia. Material containing any residue of alkali is best dyed with the addition of 10% Glauber's salt, 1—2% acetic acid and  $\frac{1}{2}$ % bichrome.

For *shading*, Brilliant Milling Blue B, Formyl Blue B, Formyl Violet, Brilliant Milling Green B are used, and for very deep Blues, Alphanol Black KBB. For subsequent shading, the same dyestuffs are used as in the case of dyeings fast to milling, whereas for piece-goods, Tetra Cyanole A, Brilliant Milling Green B, Acid Violet 6BS, Brilliant Lanafuchsine BB, Fast Acid Yellow TL, and Orange extra come mainly into consideration, these dyestuffs being added straight to the hot bath.

Alphanol Blue BR extra

„ GN

„ 5RN



ALKALINE BLUE, EOSINES.

Method VIII.

Charge the bath with

1—2% soda ash or

3—6% borax, and the dyestuff;

enter the goods at about 60° C. (140° F.), raise in 15 to 20 minutes to about 90° C. (195° F.), and work at this temperature for ½ to ¾ hour, according to the depth of the shade to be dyed. Then rinse, develop in a fresh bath of 60—70° C. (140—160° F.) with 4—5% sulphuric acid for ¼ hour, and rinse again thoroughly.

Copper vessels should be avoided as far as possible in the dyeing, as the shades turn out less bright in copper vessels.

The baths for full shades do not exhaust entirely, and are used over again to advantage for subsequent lots.

Carbonised goods should be completely neutralised before the dyeing.

For *subsequent shading*, Brilliant Milling Blue B, Cyanole FF, Brilliant Milling Green B and Formyl Violet 4BF are used, which are added to the sulphuric acid developing bath.

Method IX.

1. Charge the bath with

10% Glauber's salt crystals,

2—5% acetic acid (according to the depth of shade to be dyed), and the dyestuff; enter the goods at 50° C. (120° F.), raise to the boil within ½ hour, and after boiling gently for about ¾ hour, add some acetic acid if necessary in order to exhaust the bath.

2. By this method particularly brilliant shades are obtained.

Prepare the dyebath with

5% acetic acid,

5% alum and

3% tartar;

boil therein for ½ hour, cool off to abt. 50° C. (120° F.), add the dyestuffs in solution, raise gradually to the boil, and boil gently for 20 to 30 minutes. If the bath is not exhausted, a little acetic acid should be added.

For both methods copper vessels should be avoided, in order to obtain the brightest possible shades.

If any further quantities of these dyestuffs have to be added subsequently for shading, the bath must be cooled off previously; if the shading is carried out with Rosazeine B alone or in combination with Orange GG, these dyestuffs may be added straight to the boiling bath.

Alkaline Blue 6B

„ 5B

„ 4B

„ 4B extra

„ 3B

„ 2B

„ B

„ R

„ 2R

„ 3R

Alkaline Violet CA

„ C

Eosine 3G

„ GGF

„ L

„ BN

Eosine Scarlet B

Erythrosine yellow shade

„ D

„ extra N

„ B

Phloxine

„ S

Rose Bengale extra N

ACID CHROME COLOURS.

Anthracene Yellow C Powder  
and Paste, R  
Anthracene Orange G  
Anthracene Chrome Brown  
KDR, DWN  
Anthracene Chromate Brown  
EB, WS, WG, 3G  
Anthracene Acid Brown  
R, N, B, V, SW  
Anthracene Chrome Red G  
Anthracene Chrome Blue FR\*  
Anthracene Acid Blue EB\*,  
ER\*, KBB\*, KBR\*, BBN\*  
Anthracene Blue Black C,  
BE\*, BG\*, KG\*  
Anthracene Chromate Grey  
G\*, KB  
Alizarine Brilliant Green  
G, SE  
Anthracene Chromate Green  
B\*, KFF extra  
Anthracene Chrome  
Black F  
" FE  
" 5B  
" P extra\*  
" PF extra  
" PFB extra  
" PFBB extra  
" PFR extra  
" PR extra\*  
" PPN extra  
" PPC extra  
" PPS extra\*  
" PPT extra  
" PBB\*  
" KV  
" KBG  
" KM  
Anthracene Acid  
Black ST  
" DSF  
" DSN  
" DSFB  
" DNG  
" SW  
" LW

Further, all the dyestuffs  
enumerated sub Method  
XI may be dyed accord-  
ing to the above method.

Method X.

Charge the bath with

2—3% acetic acid,  
10% Glauber's salt crystals (for piece-  
goods), and the dyestuff;

enter the goods at 40—500 F. (105—1200 F.),  
raise in ½ hour to the boil, and after ½ hour's  
boiling, exhaust by gradually adding

4—6% acetic acid or

1—3% sulphuric acid,

according to the depth of shade to be dyed.  
Hereafter cool off a little, add the requisite  
quantity of bichrome, and boil for another  
½ to ¾ hour. For Black, enter the goods at  
about 700 C. (1600 F.), and raise immediately  
to the boil.

Of bichrome as a rule about one-half the  
weight of the dyestuff is required; in the case  
of dyeings in which *Anthracene Chrome  
Brown KDR, Anthracene Chrome Blue FR,*  
or *Anthracene Chromate Green B* predomi-  
nate, the weights of bichrome should be increased  
to about two-thirds of the weight of the  
dyestuff.

For blacks, only about one-third the  
amount of bichrome as of dyestuff used is  
required.

If calcareous water is used, the baths should  
in the case of *Anthracene Chrome Black F,*  
*FE,* and *Anthracene Acid Black SW, LW,*  
be corrected with 2% oxalate of ammonia (of  
the weight of the wool), before adding the  
dyestuff or acid.

When dyeing the colours marked with an  
asterisk (\*) in copper vessels or machines,  
½% ammonium sulphocyanide and 2—3% ace-  
tic acid (of the weight of the wool) are first  
added to the bath, which is stirred well, and  
allowed to stand for 30 minutes before adding  
the Glauber's salt and dyestuff.

For particulars of the subsequent shading  
see page 16.

## ACID CHROME COLOURS.

## Method XI.

Charge the dyebath with

1— 4% sulphuric acid (according to the depth of shade required),

10% Glauber's salt crystals (for piece-goods), and the dyestuff;

enter the goods at 50—60° C. (120—140° F.), raise in about ½ hour to the boil, and boil for 1 hour, then cool off a little, add the requisite amount of bichrome, and boil for about another ¾ hour. For Black, the goods may be entered at a slightly higher temperature and the bath be raised more quickly to the boil. In the case of *Azo Chrome Blue*, 1% sulphuric acid is added in addition to the bichrome, the blue being developed by one hour's boiling.

For *fancy shades*, it is usual to add about one-half to two-thirds of the weight of bichrome as of dyestuff; for *Anthracene Acid Black*, one-half, and for *Naphtylamine Black CR* one-third, the weight of bichrome as of dyestuff is sufficient. *Anthracene Yellow GG* is to advantage aftertreated with chromium fluoride, by which means greenish Yellows are obtained; the same weight is used as of dyestuff, but not exceeding 3½% of chromium fluoride.

As a rule, the same quantity of sulphuric acid as of dyestuff is used, but not less than 1% and not more than 4%, or for Blacks 5%; for *Anthracene Chrome Brown* however (with the exception of *DW*), not more than 3% sulphuric acid should be used.

When dyeing the colours marked with an asterisk (\*) in copper vessels or machines, ½% ammonium sulphocyanide and 2% acetic acid should first be added to the bath at 50° C. (120° F.) in accordance with Method X, page 12.

Regarding the *subsequent shading* see page 16.

**Anthracene Yellow** BN, RN,  
GG, RG

**Anthracene Acid Brown** G

**Anthracene Chrome Brown**  
D, DW, SWN, SWR, A

**Anthracene Chrome Red** A

**Anthracene Chrome Violet** B\*

**Anthracene Chrome Blue** G\*,  
BB\*, F\*, B\*, R\*

**Azo Chrome Blue** T, TB, AI

**Anthracene Acid Black**  
SR\*, SRT\*, SRG\*, SBB\*,  
SAS, SASG, SASB, SASN

**Naphtylamine Black** Cr\*

DIESTUFFS FOR THE CHROMATE PROCESS.

Method XII.

A. *Dyeing by adding Chrome straight to the Dyebath.*

This method is employed for light and medium shades, and for Chromate Blue Black B, and is to be preferred for dyeing in polished copper vessels, and in iron vessels.

Charge the bath at abt. 70° C. (160° F.) with the dyestuff, add the requisite bichrome (see below) in solution; enter the goods straightaway, raise in 20 to 30 minutes to the boil, and boil for 1¼ to 1¾ hours. For deep shades, add if necessary a further 1–3% acetic acid gradually, after boiling about ¾ hour.

*Dyestuff and bichrome should be dissolved each separately; the latter should be added to the dyebath only a short time before entering the goods.*

B. *Dyeing by adding the Chrome subsequently.*

This method is employed for material which is difficult to dye level or to penetrate, for dyeing *Anthracene Chromate Green B* and *Anthracene Chrome Blue RRW extra*, and particularly also for deep shades.

Charge the bath at 60–70° C. (140–160° F.) with the dyestuff solution, adding 10% Glauber's salt crystals for piece-goods; heat in 15–20 minutes to the boil, and boil ½ hour. Then cool off slightly, add the bichrome (see below), raise again to the boil in abt. 15 minutes, and boil for 1 hour. Exhaust, if necessary, gradually with acetic acid.

For dyeing by Method B, combinations containing large amounts of *Chromate Blue Black B*, abt. ¼ the amount of bichrome as of *Chromate Blue Black* used should be added at the beginning of the dyeing already.

As a rule, one-half the quantity of bichrome as of dyestuff is required, but for *Chromate Blue Black B* only one-quarter is required.

Chromate Colours are best dyed in fairly hard water; soft water may be corrected with 3–4% magnesium sulphate.

For subsequent shading see page 16.

For dissolving *Chromate Blue Black B* and *Anthracene Chrome Blue RRW extra*, see p. 3.

**Anthracene Chromate Brown**  
EB, ER, WS, WG, 3G

**Anthracene Chromate Blue**  
XR

**Anthracene Chromate Violet**  
XB

**Anthracene Chromate Green**  
B, KFF extra

**Anthracene Chromate Grey**  
G, KB

**Chromate Blue Black B**

**Anthracene Yellow BN, RN,**  
GG, C Powder and Paste,  
R, BG

**Anthracene Chrome Red G**

**Anthracene Blue Black C**

**Alizarine Brilliant Green**  
G, SE

The following dyestuffs may also be used for dyeing by the chromate process:

**Anthracene Chrome Brown**  
DWN

**Anthracene Acid Brown**  
R, N, B

**Anthracene Chrome Blue**  
RRW extra Powder  
and Paste

**Anthracene Acid Black DSF**

**Diamine Fast Red F**

**Alphanol Blue BR extra,**  
GN, 5RN

and the Acid Dyestuffs fast to milling enumerated on page 16, such as Brilliant Milling Green B, etc.

DYESTUFFS FOR DYEING CHROMED WOOL.

**Anthracene Chrome Blue**  
BW extra and RRW extra  
in Powder and Paste

**Anthracene Chrome Blue**  
BST, RST

**Anthracene Acid Blue RR, GG**  
are dyed exclusively on  
chromed wool as per  
Method XIII\*.

The following dyestuffs  
may also be applied ac-  
cording to this method:

**Anthracene Chrome Blue G,**  
BB, F, B, R

**Anthracene Acid Blue EB,**  
ER, KBB, KBR, BBN

**Anthracene Yellow C Powder**  
and Paste, EN, RN, R,  
GG, BG

**Anthracene Chromate Brown**  
EB, WS, WG, 3G

**Anthracene Chrome Brown**  
D, DW, DWN, KDR,  
SWN, SWR

**Anthracene Acid Brown G,**  
R, N, B

**Anthracene Chrome Red A, G**

**Anthracene Chrome Violet B**

**Alizarine Brilliant Green**  
G, SE

**Anthracene Chromate Green**  
B, KFF extra

**Anthracene Blue Black**  
C, BE, BG, KG

**Anthracene Chromate Grey**  
G, KB

**Anthracene Acid Black DSF**

**Anthracene Chrome Black**  
PPS extra

\* The only exception is  
*Anthracene Chrome Blue*  
*RRW extra*, which may also  
to advantage be dyed accord-  
ing to Method XII B.

Method XIII.

Mordant the wool, according to the desired  
depth of shade, with

1—4% bichrome and  
1—3% tartar

for 1½ hours at the boil, then rinse, and dye in  
a fresh bath with the addition of

1—3% acetic acid or  
5% acetate of ammonia (for very pale  
shades or for material which is  
difficult to penetrate or to dye  
level).

Enter the goods at 40—50° (105—120° F.),  
raise in ½ hour to the boil, and boil for 1½ to  
2 hours, adding some acetic or formic acid if  
necessary after boiling for an hour, in order to  
exhaust the baths.

For dark shades it is recommended, in order  
to ensure best possible fastness to milling and  
alkalies, to chrome subsequently with

½—¾% bichrome

for 20 to 30 minutes at the boil in the ex-  
hausted dyebath.

As an assistant for the mordanting, formic  
or lactic acid, lactoline, lignorosine, etc., may be  
used in proportionate quantities in the place of  
tartar. For piece-goods, tartar is preferred.

Carbonised goods have to be neutralised  
previous to mordanting, the results obtained  
with a bichrome-sulphuric acid mordant being  
less satisfactory.

When dyeing *Anthracene Chrome Blue R*  
and *Anthracene Chromate Green B* in copper  
vessels or machines, ½% ammonium sulpho-  
cyanide and 2% acetic acid should first of all  
be added to the bath in accordance with  
Method X, page 12.

Regarding the *subsequent shading* of the  
dyeings, see page 16.

DIESTUFFS FOR SHADING CHROME COLOURS.

For the *subsequent shading* of dyeings produced by the after-chroming or chromate processes, or of dyeings on chromed wool, the same Chrome Colours as have been used for the dyeing proper are usually employed, even if the dyeings have already been fixed or chromed. This applies particularly to loose material. The dyebath is cooled off, the well dissolved and diluted dyestuff is added, and the bath brought again gradually to the boil, the boiling being maintained for 20 to 30 minutes. If very large quantities of Chrome Colours are used for subsequent shading (more than one-quarter of the quantity used originally for the dyeing), they should, in order to ensure best possible fastness to milling, be fixed with one-quarter to one-half the weight of bichrome as of dyestuff subsequently added; if only small quantities are used, it is unnecessary to after-chrome again. Bichrome should be added together with the Chromate Colours only if large quantities of dyestuff have to be subsequently added. In such case the shading is best done in a fresh bath.

On the other hand, the chromed dyeings may also be shaded subsequently with Acid Colours possessing good fastness to milling, of which the following may be mentioned:

Brilliant Milling Green B	Formyl Violet S4B, 4BF
Formyl Blue B	Milling Yellow O
Brilliant Milling Blue B	Wool Red B
Tetra Cyanole A	Milling Red G.

It is recommended to cool the bath off to some extent before adding the shading dyestuffs, well dissolved.

For yarns, and particularly also for piece-goods, easily levelling dyestuffs are frequently used, and may be added straight to the boiling liquor. Of these, the following are best suited:

Tetra Cyanole V	Fast Acid Yellow TL, 3G
Cyanole extra, FF	Orange GG
Cyanole Fast Green G	Azo Orseille BB
Cyanole Green B, 6G	Acid Violet 6BC.



DIAMINE COLOURS.

Method XIV.

Charge the bath with

10—20% Glauber's salt crystals (according to the depth of shade)

or

10—20% Glauber's salt crystals,  
5% acetate of ammonia, and the dyestuff.

Enter the goods at about 60° C. (140° F.), raise in 20 minutes to the boil, and boil for  $\frac{3}{4}$  to 1 hour. Then take a sample for matching, and if necessary, shade with the same dyestuffs in the boiling bath.

The bath may be exhausted completely by gradually adding 2—5% acetic acid, which is however usually employed only for Colours which are used for self shades, or which are to be aftertreated with bichrome, chromium fluoride or copper sulphate.

The *aftertreatment* is carried out either in the dyebath exhausted with acetic acid, or in a fresh bath with the addition of 3—4% acetic acid, whilst boiling gently for about  $\frac{1}{2}$  hour. Of bichrome, about one-half the amount of that of dyestuff indicated is used, and of chromium fluoride or copper sulphate about the same amount as of dyestuff.

An aftertreatment with *bichrome* or *chromium fluoride* comes into consideration for increasing the fastness to washing and milling of the following dyestuffs:

*Diamine Brown R, M, B,*  
*Diamine Catechine G, 3G,*  
*Diamine Fast Red F,*  
*Diamine Fast Grey BN,*  
*Diaminogene extra.*

A treatment with *chromium fluoride* comes into consideration for

Diamine Green G,

and with *copper sulphate*, for increasing the fastness to light, for

*Diamine Orange B,*  
*Diamine Brown 3G, M, B,*  
*Diamine Catechine G, 3G,*  
*Diamine Sky Blue FF,*  
*Diamine Blue RW.*

Thioflavine S  
Diamine Fast Yellow FF, 3G  
Diamine Yellow CP  
Diamine Gold  
Diamine Orange F, B  
Oxy Diamine Orange G, R  
Diamine Brown  
3G, R, M, B, S  
Diamine Catechine G, 3G  
Oxy Diamine Brown G  
Diamine Fast Red F  
Diamine Scarlet B, 3B  
Diamine Red 4B, 6B, 10B  
Diamine Purpurine  
B, 3B, 6B  
Diamine Rose  
GD, BG, BD, FFB  
Direct Rose T  
Diamine Bordeaux B, S  
Diamine Brilliant Bordeaux  
R  
Diamine Fast Violet  
BBN, FFBN, FFRN  
Diamine Violet N  
Oxy Diamine Violet B, G, R  
Oxy Diamine Blue  
5G, 3G, B, R  
Diamine Sky Blue FF  
Diamine Blue  
RW, 3B, 2B, BX  
Diamine Steel Blue L  
Diamine Green  
FG, G, B, CL  
Diamine Dark Green N  
Diamine Fast Grey BN  
Diamine Black DN, HW  
Diaminogene extra

BASIC COLOURS.

Method XV.

Charge the bath with

2—3% acetic acid and the dyestuff;

enter the goods at 50° C. (120° F.), raise the temperature to 80° C. (175° F.) in the course of about ½ hour, and dye for another 15 to 20 minutes at this temperature.

Dyeings which have turned out too dark may easily be stripped a little by adding acetic acid to the dyebath, and heating if necessary almost to boiling temperature.

*Irisamine* can also be dyed like *Rosa-zéine*, according to Method III, page 6.

*Victoria Blue* is dyed to best advantage with the addition of 10% Glauber's salt crystals and 10% bisulphate of soda, or 4% sulphuric acid. Enter at about 50° C. (120° F.), raise the temperature gradually to the boil, and boil for 1 hour.

For *Green*, the following method is frequently applied, and yields fuller shades:

For 100 lbs of wool, dissolve

20 lbs sodium thiosulphate (hyposulphite of soda) and

10 lbs alum

in the dyebath, adding

4 lbs sulphuric acid of 168° Tw.

when these salts are dissolved. Enter the yarn at 40° C. (105° F.) into the milky bath, heat gradually to 80° C. (175° F.), work for 1 hour, rinse thoroughly in water, and add to the last rinsing bath 1/5 gallon ammonia per 100 gallons. Then dye as indicated above, in an acetic acid bath, at a temperature of 80° C. (175° F.).

Magenta Ia. Dia.

Magenta yellow shade

Cerise prima

Russian Red B, G

Aniline Brown

Irisamine G

Methyl Violet 6B—4R

Crystal Violet 5B bluish, 10B

Victoria Blue B

New Methylene Blue N, NSS

Solid Green Crystals O

Malachite Green conc.

Brilliant Green

Crystals extra

Thioflavine T, TCN

Chrysoïdine AG, Crystals R

Bismarck Brown

FFG, GG, EE.



3  
3

## DYEING OF LOOSE WOOL.

•  
—————  
•



## DYEING OF LOOSE WOOL.

**Scouring.** In order to ensure good and level results in dyeing, the wool must first be well freed from the adhering impurities, such as suint, grease etc. The wool to this end is soaked in wool washing machines, or in troughs, which are charged according to the amount of impurities of the wool with a liquor containing varying quantities of soda (on an average 3—4% soda ash calculated on the weight of the wool) or soda and some soap or ammonia, care being taken that the temperature of the bath does not exceed 40—50° C. (105—120° F.). The wool is worked gently in this liquor for 20 to 30 minutes, squeezed off well by means of the squeezing rollers, and rinsed in a wool washing machine or in a rinsing machine with a plentiful supply of fresh water until the rinsing water runs off perfectly clear.

**Carbonising.** In order to remove any vegetable impurities such for instance as burls, straw, particles of wood, grass etc., the scoured wool is carbonised or extracted.

The well scoured wool is saturated with a cold sulphuric acid solution twaddling 4—7 degrees contained in vats of wood, stone or cement. It is then whizzed in hydroextractors lined with lead or coated with an enamel paint resisting acids, and brought into the so-called carbonising stove. In this stove the wool is dried at 80—90° C. (175—195° F.). After this carbonising, it is washed or neutralised with a soda solution of 3—7° Tw., and then rinsed well. A good rinsing or neutralising is most essential to ensure good results in dyeing, because the large amount of acid contained in the carbonised wool would cause the dyestuff to rush too quickly on to the fibre, unlevel dyeings being the result.

**Bleaching.** Yellow wools must be bleached sometimes in order to become pure white. For bleaching loose wool bisulphite is mostly used.

The well scoured and wetted-out wool is entered into a cold bath of 3—4 gallons bisulphite of 64° Tw. and  $\frac{3}{8}$  gallons concentrated sulphuric acid per 100 gallons liquor, and turned from time to time, being immersed for several hours, and, after throwing out, allowed to drain well. It is then soured off in a cold bath containing  $\frac{1}{2}$  gallon concentrated sulphuric acid per 100 gallons liquor, washed, and dried at a moderate temperature. The bleaching is best done in vats of wood, stone, or cement; metal vats should be avoided in order to avoid the risk of spots being formed on the wool.

In order to improve the clearness and purity of the white and to produce the so-called porcelain-white, traces of any of the following dyestuffs in solution are added to the bisulphite bath or to the last rinsing bath:

Brilliant Milling Blue B  
Formyl Violet S4B, 4BF  
Crystal Violet 5B bluish  
Methyl Violet B—6B  
New Methylen Blue N  
Victoria Blue B,

according to the shade desired, particular care being taken that the wool is worked very thoroughly.

Solid bisulphite may also be used in the place of the bisulphite solution one-third to one-half of the aforementioned quantities being required when using the solid form.

**Dyeing.** Loose wool may be dyed in open vessels or in dyeing machines.

When using open vats, the normal volume of water should be 30 to 40 times, when dyeing in machines only 10 to 20 times, the weight of the wool.

Full particulars for the dyeing of loose wool in machines are to be found in chapter 5, page 75.

For the production of dyeings very fast to milling, the *Anthracene Colours* are in the first place used, and some Acid Colours which are especially fast to milling,

such as *Milling Yellow*, *Milling Red*, *Wool Red*, *Formyl Violet*, *Formyl Blue*, *Brilliant Milling Blue*, *Tetra Cyanole A*, *Alphanol Blue*, *Brilliant Milling Green*, *Anthracite Black* and *Alphanol Black*. Numerous Diamine Colours are also entirely fast to milling next to wool; and some of this group, as for instance *Diamine Fast Red F*, *Diamine Green G*, *Diamine Brown R*, *M* and *B*, *Diamine Catechine G* and *3G*, *Diamine Fast Grey BN*, may by an aftertreatment with bichrome or chromium fluoride be fixed so completely as to possess very good fastness to milling even next to cotton.

Loose wool is dyed exactly according to the instructions given on pages 4 to 17, with the dyestuffs indicated in the following tables.

If dyestuff, acid or bichrome are to be added subsequently to the dyebath, such additions are made by sprinkling the diluted solutions of these ingredients over the wool; before doing so, however, the dyebaths should be cooled off to some extent, especially when dyeing light or medium shades.

When dyeing in machines, it is essential to use as soft water as can be had, condensed water to best advantage.

When dyeing in copper machines or polished copper vessels with dyestuffs which are sensitive to copper, it is well to add about  $\frac{1}{2}\%$  ammonium sulphocyanide calculated on the weight of the wool. After some time the copper becomes covered with a thin coating which prevents the action of the copper on the dyestuffs to a certain extent and which should therefore not be removed unnecessarily.

# DYESTUFFS FOR GREY AND MODE SHADES

## Acid Colours

### For light Milling:

Combinations of

Cyanole Fast Green G Milling Yellow O Wool Red B Formyl Violet S4B	}	Method III, page 6
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### For severer Milling:

Combinations of

Brilliant Milling Green B Tetra Cyanole A Milling Yellow O Milling Red G Formyl Violet S4B	}	Method III, page 6
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Dyeings of Brilliant Milling Green B are rendered a little lighter by severe alkaline treatment, the original shade returning however on souring off afterwards.

For Grey, the following may also be used:

Anthracite Black B, R Alphanol Black KBB	}	Method V, page 8
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## Diamine Colours

### Of good Fastness to Milling next to Wool:

Combinations of

Diamine Black DN Diaminogene extra Diamine Yellow CP Diamine Brown R, M Diamine Catechine G Diamine Scarlet B, 3B Diamine Fast Violet FFBN	}	Method XIV, page 17
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Excellently Fast to Milling next to Wool, and sufficient also for light

### Milling next to Cotton:

Combinations of

Diamine Fast Grey BN Diamine Fast Yellow FF Diamine Brown R, M Diamine Catechine G Diamine Fast Red F	}	afterchromed, Method XIV, page 17
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The following dyestuffs yield shades particularly fast to light:

Diaminogene extra  
 Diamine Fast Grey BN  
 Diamine Yellow CP  
 Diamine Fast Yellow FF  
 Diamine Scarlet B, 3B  
 Diamine Fast Red F.

## Chrome Colours

Eminently Fast to Milling and Light:

**a) After-chroming Process:**For very light shades:

Combinations of

Anthracene Blue Black	} Method X and XI, p. 12 and 13
C, KG	
Anthracene Chrome Blue G	
Anthracene Yellow	
BN, RN, GG	
Anthracene Chrome Brown	
SWN, D	
Anthracene Chrome Red A	
Anthracene Chrome	
Violet B	

For medium and dark shades:

Combinations of the above	} Method X and XI, pages 12 and 13
dyestuffs and the following:	
Anthracene Blue Black	
BG, BE	
Anthracene Chrome Blue	
BB, F	
Anthracene Yellow C	
Anthracene Chrome	
Brown SWR, DWN	

**b) Chromate Process:**For very light shades:

Combinations of

Chromate Blue Black B	} Method XII, page 14
Anthracene Blue Black C	
Anthracene Chromate	
Grey KB	
Anthracene Yellow	
BN, RN, GG	
Anthracene Chromate	
Brown EB, ER, 3G	
Anthracene Chromate	
Violet XB	

For medium and dark shades:

Combinations of the above	} Method XII, page 14
dyestuffs and the following:	
Anthracene Chromate	
Grey G	
Anthracene Chromate	
Blue XR	
Anthracene Yellow C	
Anthracene Chromate	
Brown WS, WG	

**c) On Chromed Wool:**For very light shades:

Combinations of

Anthracene Blue Black	} Method XIII, p. 15
C, KG	
Anthracene Yellow BN, RN	
Anthrac. Chrome Brown D	
Anthracene Chrome Red A	
Anthracene Chrome	
Violet B	

For medium and dark shades:

The dyestuffs in the opposite	} Method XIII, page 15
column in combination with	
Anthrac. Blue Black BG, BE	
Anthracene Chrome Blue	
G, BB	
Anthracene Yellow C	
Anthracene Chromate	
Brown EB, WS, WG	

Fast to Potting and Cross-Dyeing:

Combinations of

Anthracene Blue Black BE, BG	Anthracene Chrome Brown
Anthracene Chrome Blue F, G	SWN, D
Anthracene Yellow C	Anthracene Chrome Red A
	Method X, page 12.

For subsequent shading see page 16.

## Acid Colours

### For light Milling:

Combinations of

Milling Yellow O Wool Red B Cyanole Fast Green G Formyl Violet S4B (for prune shades)	} Method III, page 6
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### For severer Milling:

Combinations of

Milling Yellow O Milling Red G Brilliant Milling Green B Tetra Cyanole A Formyl Violet S4B (for prune shades)	} Method III, page 6
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Dyeings of Brilliant Milling Green B are rendered a little lighter by severe alkaline treatment, the original shade returning however on souring off afterwards.

## Diamine Colours

### Of good Fastness to Milling next to Wool:

Combinations of

Diamine Brown 3G, R, M, B Diamine Catechine G Diamine Yellow CP Diamine Scarlet B, 3B Diamine Black DN Diaminogene extra	} Method XIV, page 17
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### Excellently Fast to Milling next to

Wool and sufficient for light

### Milling next to Cotton:

Combinations of

Diamine Brown R, M, B Diamine Catechine G Diamine Fast Yellow FF Diamine Fast Red F Diamine Fast Grey BN	} afterchromed. Method XIV, page 17
--	---

The following dyestuffs yield shades particularly fast to light:

Diamine Fast Red F  
 Diamine Scarlet B, 3B  
 Diamine Yellow CP  
 Diamine Fast Yellow FF  
 Diaminogene extra  
 Diamine Fast Grey BN



## Chrome Colours

Eminently Fast to Milling and Light:

### a) After-chroming Process:

Combinations of

Anthracene Chrome Brown  
SWN, SWR, D, DWN,  
DW, KDR

Anthracene Chromate  
Brown EB, WS, WG

Anthrac. Yellow BN, RN, C

Anthracene Orange G

Anthrac. Chrome Red A, G

Anthracene Blue Black  
BG, BE, KG

Anthrac. Chrome Violet B  
(for Prune)

Produced in a cheaper manner with

combinations of

Anthrac. Acid Brown N, B, G

Anthracene Chrome  
Brown DWN

Anthr. Chromate Brown EB

Anthracene Yellow C, BG

Anthracene Chrome  
Black PPC extra

Anthrac. Acid Black DSF

Anthrac. Chrome Violet B  
(for Prune)

Method X and XI, pages 12 and 13

Method X, page 12

### b) Chromate Process:

Combinations of

Anthracene Chromate  
Brown EB, ER, WS,  
WG, 3G

Anthrac. Yellow BN, RN, C

Anthracene Orange G

Anthracene Chrome Red G

Chromate Blue Black B

Anthracene Chromate  
Grey G, KB

Anthrac. Chromate Blue XR

Anthracene Chromate  
Violet XB

(for Prune)

Produced in a cheaper manner with

combinations of

Anthracene Chromate  
Brown EB, ER, 3G

Anthracene Acid Brown B

Anthracene Yellow C, BG

Anthrac. Chromate Grey G

Anthracene Chromate  
Violet XB

(for Prune)

Method XII, page 14

Method XII, page 14

### c) On Chromed Wool: Combinations of

Anthracene Chromate  
Brown EB, WS, WG

Anthracene Chrome Brown  
DWN, KDR

Anthracene Yellow BN, RN, C

Anthracene Chrome Red A

Method XIII, page 15.

Anthracene Blue Black  
BE, BG, KG

Anthracene Chrome Blue BB

Anthracene Chrome Violet B  
(for Prune)

Fast to Potting and Cross-Dyeing:

Combinations of

Anthracene Chrome Brown  
SWN, D

Anthracene Yellow C

Anthracene Chrome Red A

Anthracene Blue Black BE

Anthracene Chrome Blue F

Anthracene Chrome Black

PPC extra

Method X, page 12.

For subsequent shading see page 16.

# DYESTUFFS FOR YELLOW, ORANGE

## Acid Colours

For light Milling and severer

Milling:

Yellow and Orange.

Milling Yellow O combined with Milling Red G Rosazeïne B	} Method III, page 6
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Pink.

Rosazeïne B combined with Milling Yellow O	} Method III, page 6
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Of better Fastness to Light:

Wool Red B combined with Milling Yellow O Rosazeïne B	} Method III, page 6
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## Diamine Colours

Of good Fastness to Milling next  
to Wool:

Yellow and Orange.

Thioflavine S Diamine Yellow CP Diamine Fast Yellow FF, 3G Diamine Orange F or combinations of Diamine Yellow CP Diamine Scarlet B Diamine Purpurine B Diamine Fast Red F	} Method XIV, page 17
--	-----------------------

or of

Milling Yellow O Diamine Scarlet B	} Method III, page 6
---------------------------------------	-------------------------

Pink.

Diamine Rose GD, BD, FFB Diamine Scarlet B, 3B brightened with Rosazeïne B	} Method XIV, page 17
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The following dyestuffs yield shades of particularly good fastness to light:

Milling Yellow O  
 Wool Red B  
 Diamine Yellow CP  
 Diamine Fast Yellow FF, 3G

Diamine Orange F  
 Diamine Scarlet B, 3B  
 Diamine Rose GD, BD

## Chrome Colours

Eminently Fast to Milling and Light:

### a) After-chroming Process:

**Yellow and Orange.**

Anthracene Yellow GG fixed with chromium fluoride	} Methods X and XI, pages 12 and 13
Anthracene Yellow BN, RN, C	
Anthracene Orange G combined with	
Diamine Fast Red F Anthracene Chrome Red A, G	

**Pink.**

Diamine Fast Red F brightened with Rosazeïne B	} Method XIV, page 17

For duller shades:

Anthracene Chrome Red G, A  
Method X, page 12.

### b) Chromate Process:

**Yellow and Orange.**

Anthracene Yellow BN, RN, C, GG	} Method XII, page 14
Anthracene Orange G combined with	
Diamine Fast Red F	
Anthracene Chrome Red G	

**Pink.**

Diamine Fast Red F brightened with Rosazeïne B	} Method XII, page 14

For duller shades:

Anthracene Chrome Red G  
Method XII, page 14

### c) On Chromed Wool (only for Yellow and Orange):

Anthracene Yellow BN, RN, C, GG	} Method XIII, page 15
Anthracene Orange G combined with	
Diamine Fast Red F	
Anthracene Chrome Red A, G	

Fast to Potting and Cross-Dyeing:

Anthracene Yellow C shaded with Diamine Fast Red F Anthracene Chrome Red A	} Method X, page 12

For subsequent shading see page 16.

## Acid Colours

In good Fastness to Milling next to Wool and Cotton:

Red and Claret.

Milling Red G, FR shaded with Rosazeine B Milling Yellow O Formyl Violet S4B	}	Method III, page 6
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In good Fastness to Milling next to Wool:

Wool Red B shaded as stated for Milling Red G	}	Method III, page 6
---	---	-----------------------

For light Milling:

Violet.

Formyl Violet 6B, 8B, 10B Acid Violet 6BS, 6BC shaded with Lanafuchsine 6B Wool Red B	}	Method III and I, page 6 and 4 respectively
--	---	--

For severer Milling:

Formyl Violet S4B, S5B, 4BF Alkaline Violet CA shaded with Brilliant Milling Blue B	}	Method III, page 6
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The following dyestuffs yield shades of particularly good fastness to light:

Milling Yellow O  
 Milling Red FR  
 Wool Red B  
 Lanafuchsine 6B

## Diamine Colours

Of good Fastness to Milling next to Wool:

Red and Claret.

Diamine Scarlet B, 3B Diamine Red 4B, 6B, 10B Diamine Purpurine B, 3B, 6B Diamine Fast Red F Diamine Bordeaux B, S Diamine Brilliant Bordeaux R shaded with Diamine Yellow CP Diamine Fast Violet FFBN, FFRN Oxy Diamine Violet B	}	Method XIV, page 17
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Violet.

Diamine Fast Violet FFBN, FFRN Diamine Violet N Oxy Diamine Violet B brightened with Alkaline Violet CA Brilliant Milling Blue B	}	Method XIV, page 17
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The following dyestuffs yield shades of particularly good fastness to light:

Diamine Scarlet B, 3B  
 Diamine Fast Red F  
 Diamine Bordeaux B  
 Diamine Brilliant Bordeaux R  
 Diamine Fast Violet  
                     FFBN, FFRN  
 Diamine Violet N  
 Diamine Yellow CP

# AND VIOLET ON LOOSE WOOL.

## Chrome Colours

Eminently Fast to Milling and Light:

### a) After-chroming Process:

Red and Claret.

Diamine Fast Red F	} Methods X and XI, pp. 12 and 13
Anthracene Chrome Red	
G, A	
shaded with	
Anthracene Chrome Violet B	

For Madder Shades on Military

Cloths:

Diamine Fast Red F	} Method X, page 12
shaded with	
Anthracene Yellow C	
Anthracene Blue Black BE	

Violet.

Anthracene Chrome	} Method XI and X, pp. 13 and 12 respectively
Violet B	
brightened with	
Formyl Violet S4B, 4BF	
Brilliant Milling Blue B	

### b) Chromate Process:

Red and Claret.

Anthracene Chrome Red	} Method XII, page 14
Diamine Fast Red F	
shaded with	
Anthracene Chromate	
Violet XB	

Violet.

Anthracene Chromate	} Method XII, page 14
Violet XB	
brightened with	
Formyl Violet S4B, 4BF	
Brilliant Milling Blue B	

### c) On Chromed Wool:

Red and Claret.

Diamine Fast Red F	} Method XIII, page 15
Anthracene Chrome Red	
G, A	
shaded with	
Anthracene Chrome Violet B	

Violet.

Anthracene Chrome	} Method XIII, page 15
Violet B	
brightened with	
Formyl Violet S4B, 4BF	
Brilliant Milling Blue B	

Fast to Potting and Cross-Dyeing:

Diamine Fast Red F	} Methods X and XI, pages 12 and 13
Anthracene Chrome Red A	
shaded with	
Anthracene Yellow C	
Anthracene Blue Black BE	

For subsequent shading see page 16.

Acid Colours

Light Blue.

Of good Fastness to Milling:

Brilliant Milling Blue B  
Formyl Blue B  
Tetra Cyanole A  
shaded with  
Formyl Violet S4B, 4BF  
Brilliant Milling Green B

Method III, for  
Tetra Cyanole  
also I, p. 6 and 4

further, for lighter Milling:

Alkaline Blue 6B-3R  
shaded with  
Alkaline Violet CA

Method  
VIII,  
page 11

The Alkaline Blue dyeings must  
be soured off after alkaline washing  
or milling.

Navy and Dark Blue.

Of very good Fastness to Light  
and Milling:

Alphanol Blue GN,  
5RN, BR extra  
shaded with  
Formyl Violet S4B, 4BF  
Brilliant Milling Blue B  
Brilliant Milling Green B

Method VII,  
page 10

Dyeings with Alphanol Blue  
come into consideration for goods  
which are subjected to a light  
steaming only.

Cheap Dark Blue.

Anthracite Black B, R  
shaded as stated above for  
Alphanol Blue.  
Method V, page 8.

Diamine Colours

Of good Fastness to Milling next  
to Wool:

Diamine Blue RW which  
may be aftertreated with  
sulphate of copper,  
Oxy Diamine Blue 5G  
" 3G  
" B  
" R  
Diamine Steel Blue L,  
shaded with  
Diamine Fast Violet FFBN,  
FFRN  
Diaminogene extra  
and for brightening:  
Formyl Violet 4BF  
Brilliant Milling Blue B

Method XIV, page 17

## Chrome Colours

Excellently Fast to Milling and Light:

a) After-Chroming Process:

Anthracene Chrome Blue F, FR, BB, G, R, B Anthracene Acid Blue EB, ER, KBR shaded with Formyl Violet S4B, 4BF Brilliant Milling Blue B Formyl Blue B Tetra Cyanole A Brilliant Milling Green B Anthracene Chrome Violet B	} Methods X and XI, pages 12 and 13
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Cheaper Dark Blue.

Anthracene Blue Black BE Anthracene Chrome Black F, PPS extra, PPC extra, PBB shaded as stated above	} Method X, page 12
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b) On Chromed Wool:

Anthracene Chrome Blue RRW extra, BW extra, G, R Anthracene Acid Blue EB, ER, KBR shaded with Formyl Violet S4B, 4BF Brilliant Milling Blue B Brilliant Milling Green B Anthracene Acid Blue RR Anthracene Chrome Violet B	} Method XIII, page 16
--	---------------------------

c) Chromate Process:

Anthracene Chrome Blue RRW extra		Anthracene Chromate Blue XR
shaded with:		
Formyl Violet S4B, 4BF Brilliant Milling Blue B Formyl Blue B		Tetra Cyanole A Brilliant Milling Green B Anthracene Chromate Violet XB
Method XII, page 14		

Fast to Potting and Cross-Dyeing:

Anthracene Chrome Blue F Anthracene Chrome Blue G Anthracene Chrome Blue BB	} Method XI, page 13.
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For subsequent shading see page 16.

# DYESTUFFS FOR GREEN AND OLIVE

## Acid Colours

### For light Milling:

#### Combinations of

Cyanole Fast Green G	<div style="font-size: 3em; line-height: 1;">}</div> <div style="font-size: 0.8em; line-height: 1;">Method III, page 6</div>
Naphtol Dark Green G	
Milling Yellow O	
Wool Red B	
Tetra Cyanole A	

#### Bright Greens:

Cyanole Fast Green G	<div style="font-size: 3em; line-height: 1;">}</div> <div style="font-size: 0.8em; line-height: 1;">Method I and III, pages 3 and 6</div>
shaded with	
Milling Yellow O	
Tetra Cyanole A	

### For severer Milling:

#### Combinations of

Brilliant Milling Green B	<div style="font-size: 3em; line-height: 1;">}</div> <div style="font-size: 0.8em; line-height: 1;">Method III, page 6</div>
Milling Yellow O	
Milling Red G	
Formyl Blue B	
Brilliant Milling Blue B	

#### Bright Greens:

Brilliant Milling Green B	<div style="font-size: 3em; line-height: 1;">}</div> <div style="font-size: 0.8em; line-height: 1;">Method III, page 6</div>
shaded with	
Milling Yellow O	
Formyl Blue B	

## Diamine Colours

### In good Fastness to Milling next to Wool:

#### Combinations of

Diamine Green FG, G,	<div style="font-size: 3em; line-height: 1;">}</div> <div style="font-size: 0.8em; line-height: 1;">Method XIV, page 17</div>
B, CL	
Diamine Dark Green N	
Diamine Yellow CP	
Diamine Brown 3G, R.	
Diamine Scarlet B	

### Excellently Fast to Milling next to Wool; also sufficient for light

### Milling next to Cotton:

#### Combinations of

Diamine Green G	<div style="font-size: 3em; line-height: 1;">}</div> <div style="font-size: 0.8em; line-height: 1;">aftertreated with chromium fluoride Method XIV, p. 17</div>
Diamine Fast Yellow	
FF	
Diamine Catechine G	
Diamine Brown R	
Diamine Fast Red F	

The shades produced with Brilliant Milling Green B become lighter on severe alkaline treatment, but by subsequently passing the goods through an acid bath the original shade will reappear.



## Chrome Colours

Eminently Fast to Milling and Light:

### a) After-chroming-Process;

Combinations of  
 Alizarine Brilliant Green G, SE  
 Anthracene Chromate Green KFF extra  
 Anthracene Chrome Blue G, BB  
 Anthracene Yellow BN, GG, C  
 Anthracene Chrome Brown D, DWN, SWN

Methods X and XI,  
pages 12 and 13

Bright Greens:

Alizarine Brilliant Green G, SE  
 shaded with  
 Anthracene Yellow BN, GG  
 Brilliant Milling Green B  
 (for brightening)

Method X,  
page 12

### b) Chromate Process:

Combinations of  
 Alizarine Brilliant Green G, SE  
 Anthracene Chromate Green KFF extra, B  
 Chromate Blue Black B  
 Anthracene Chromate Blue XR  
 Anthrac. Yellow BN, C, GG  
 Anthracene Chromate Brown EB, WS, WG

Method XII, page 14

Bright Greens:

Alizarine Brilliant Green G, SE  
 Anthracene Chromate Green KFF extra, B  
 shaded with  
 Anthracene Yellow BN, GG  
 Brilliant Milling Green B  
 (for brightening)

Method XII,  
page 14

### c) On Chromed Wool:

Combinations of  
 Alizarine Brilliant Green G, SE  
 Anthracene Chromate Green KFF extra  
 Anthracene Chrome Blue G, BW extra  
 Anthrac. Yellow C, BN, GG  
 Anthracene Chromate Brown EB, WS, WG

Method XIII, page 15

Bright Greens:

Alizarine Brilliant Green G, SE  
 Anthracene Chromate Green KFF extra, B  
 shaded with  
 Anthracene Yellow BN, GG  
 Brilliant Milling Green B  
 (for brightening)

Methods XIII,  
page 15

Fast to Potting and Cross-Dyeing:

Combinations of

Anthracene Chrome Blue G, BB	Anthracene Chrome Brown
Anthracene Yellow C	D, SWN

Method X, page 12.

For subsequent shading see page 16.

## Acid Colours

For light Milling:

Naphtyl Blue Black N	{	Method VI,
„ FBB	}	page 9

For severer Milling:

Alphanol Black BG	{	
„ KBB	}	Method V,
„ 3BN	}	page 8
„ KSB	}	

For Covered Blacks:

Alphanol Black	{	
KWAN conc.	}	Method V,
„ KV	}	page 8
„ R	}	

Alphanol Black KBB, 3BN, KSB, KWAN conc. and KV possess the best fastness to milling.

Dyestuffs best suited for shading:

For very bluish Blacks:

Formyl Violet, all brands  
Brilliant Milling Blue B  
Formyl Blue B  
Brilliant Milling Green B

For Jet Black:

Milling Yellow O.

## Chrome Colours

In good Fastness to Milling  
and Light

Anthracene Acid Black	{	
SW	}	Method X,
Anthracene Acid Black	}	page 12
LW	}	
(for reddish Black)	}	

Particularly easily levelling:

Anthracene Acid Black	{	
„ SR	}	Method XI,
„ SRG	}	page 13
Anthracene Acid Black	}	
SBB (for Blue-Black)	}	

Dyestuffs best suited for shading:

For very bluish Blacks:

Formyl Violet S4B, 4BF  
Brilliant Milling Blue B  
Formyl Blue B  
Brilliant Milling Green B  
Anthracene Chrome Blue F  
Anthracene Acid Blue EB  
Anthracene Acid Blue ER  
Anthracene Chrome Violet B

for Blacks particularly fast to light

For Jet Black:

Anthracene Yellow C, BN, R  
Anthracene Acid Brown G  
Anthracene Orange G.

For subsequent

## Chrome Colours

In very good Fastness to Milling  
and Light:

Anthracene Chrome Black F  
Anthracene Chrome Black 5B (for Blue-Black)

For Covered Blacks:

Anthracene Chrome Black FE

For Cheaper Blacks:

Anthracene Acid Black DSF, DSN, DSFB  
Anthracene Acid Black DNG (for Blue-Black)

Method X, page 12

Dyestuffs best suited for shading:

See page 36, second column.

Eminently Fast to Milling, Potting  
and Light:

Anthracene Chrome Black  
PPN extra, PPC extra,  
KV, P extra, PF extra,  
PFB extra

For Blue-Black:

Anthracene Chrome Black  
PPS extra, PBB

For Covered Blacks:

Anthracene Chrome Black  
PPT extra, PFR extra,  
PR extra

Method X, page 12

Dyestuffs best suited for shading:

For Blue-Black:

Anthracene Chrome Blue F  
Anthracene Blue Black BE

For Jet Black:

Anthracene Yellow C  
Anthracene Orange G  
Anthracene Chrome Red A.

For Goods to be Cross-Dyed:

Anthracene Chrome Black P extra  
" PF extra  
" PFB extra  
" F  
" 5B  
Anthracene Acid Black DSF  
" DSN

Method X,  
page 12

For obtaining good fastness to cross-dyeing, a stronger chroming should be applied, viz. in the following proportions:

For 4% dyestuff, 1.5% bichrome

.. 5% .. 2 % ..

.. 6% .. 2.5% ..

.. 7% and more dyestuff, 3% bichrome.

shading see page 16.

Special Properties of Fastness of the Dyestuffs  
Enumerated in the Tables on Pages 24—37.

*Dyestuffs Fast to Steaming:*

The dyestuffs mentioned in the tables possess excellent fastness to steaming, with the exception of those stated below which change their shade more or less on severe steaming, but perfectly resist normal steaming:

Alphanol Blue, all brands	Diamine Fast Violet FFBN,
Alphanol Black,	FFRN
all brands	Oxy Diamine Violet B
Naphtyl Blue Black,	Diamine Green B, CL
all brands	Diamine Blue RW, aftertreated
Naphtylamine Black	with copper sulphate
NBB, RNB	Diaminogene extra
Anthracite Black B	Diamine Fast Grey BN
Diamine Brown 3G, R	Diamine Black DN
Diamine Catechine G	Anthracene Chrome Red G
Diamine Red 4B, 10B	Anthracene Chromate Green B
	Anthracene Acid Black LW.

*Dyestuffs Fast to Carbonising:*

The dyestuffs enumerated in the tables, with the exception of

Lanafuchsine 6B (fairly good)	Diamine Blue RW, aftertreated
Oxy Diamine Orange G, R	with copper sulphate
Diamine Brilliant Bordeaux	Diamine Black DN
R	

A good neutralising after the carbonising is required in the case of

Naphtol Dark Green G	Diamine Bordeaux B
Thioflavine S	Anthracene Orange G
Diamine Fast Yellow 3G	Anthracene Chrome Red G
Diamine Brown R	Anthracene Acid Black
Diamine Purpurine, all brands	SW, LW.
Diamine Red, all brands	

The effect of the copper sulphate is neutralised by carbonising the dyeings of

Alphanol Black, all brands	Naphtylamine Black RNB,
Naphtyl Blue Black, all brands	NBB.

*Dyestuffs Fast to Stoving:*

The following dyestuffs enumerated in the tables possess good fastness to stoving:

Milling Yellow O	Diamine Green, all brands
*Rosazeïne B	Diamine Dark Green N
Formyl Violet S4B, S5B, 4BF	Anthracene Chrome Red A
Alkaline Violet CA	Anthracene Chromate
Brilliant Milling Blue B	Brown ER
Formyl Blue B	Anthracene Chrome Violet B
Tetra Cyanole A	Anthracene Chromate
Brilliant Milling Green B	Violet XB
Cyanole Fast Green G	Anthracene Chromate
Alizarine Brilliant Green G	Blue XR
Anthracite Black B, R	Anthracene Chrome Blue
Thioflavine S	Anthracene Acid Blue
Diamine Fast Yellow FF	Azo Chrome Blue
Diamine Yellow CP	*Anthracene Acid Blue RR
Diamine Orange F	Alizarine Brilliant Green G,
Oxy Diamine Orange G	SE
Diamine Brown M, B	Anthracene Chromate Green
Diamine Fast Red F	KFF extra, B
Diamine Purpurine, { all brands	Anthracene Blue Black,
Diamine Rose, { all brands	all brands
Diamine Brilliant Bordeaux R	Anthracene Chromate Grey
Diamine Violet N	G, KB
Oxy Diamine Violet B	Anthracene Chrome Black,
Diamine Blue RW	all brands, except FE
Oxy Diamine Blue, all brands	Anthracene Acid Black DNG,
Diamine Steel Blue L	SR, SRG, SBB.

Fairly fast to stoving and sufficient for most cases are the following dyestuffs:

Milling Red G	Diamine Blue RW, aftertreated
*Formyl Violet 6B, 8B, 10B	with sulphate of copper
Naphtol Dark Green G	Anthracene Yellow C, GG
Diamine Orange B	Anthracene Chrome Brown
Oxy Diamine Orange R	DW, SWN, SWR
Diamine Brown 3G	Chromate Blue Black B
Diamine Scarlet 3B	Anthracene Chrome Black FE
Diamine Red, all brands	Anthracene Acid Black DSF,
Diamine Fast Violet	DSN, DSFB.

FFBN, FFRN

The dyestuffs marked with an asterisk (\*) bleed slightly on to white wool stoved along with the dyed wool.

## The Production of Mixtures of Extremely Good Fastness to Light.

For light-coloured mixtures fast to light, wool stained with metallic salts may be used in place of the white mixing wool, and a very much larger proportion of such stained mixing wool may be used than of the white mixing wool without giving the mixture an irregular appearance. The special advantage about this method consists in the fact that the ground shades can be used in smaller quantities, but consequently double the depth of shade as when using white mixing wool; thus, an extremely increased fastness to light of the mixture may be attained. The mixing wool stained with metallic salts is absolutely fast to light, when exposed for months or even years. (See the chapter on military and other uniform cloths). The method is protected to us by patent in all industrial countries (British Patent No 12831 of 1907).

For mixing wool, two shades in particular come into consideration, viz:

### *A. Mixing Wool dyed a Greenish Shade.*

Charge the bath with

3% bichrome,  
6% lactic acid 50% and  
1% sulphuric acid of 168° Tw.;

enter the scoured wool at 70° C. (160° F.), raise to the boil, and boil for about  $\frac{3}{4}$  hour; when the wool, which at first becomes yellow, has acquired the desired greenish shade and the liquor is perfectly clear, throw the wool out, rinse, and dry. Prolonged boiling should be avoided; if  $\frac{3}{4}$  hour's boiling does not produce the green tone, add 1% sulphuric acid, and boil for another 10 to 15 minutes.

### *B. Mixing Wool dyed a Drab Shade.*

Dye the scoured wool, as given under (A), with

3 % bichrome	6% lactic acid 50%
0.5% copper sulphate	1% sulphuric acid

When the bath is exhausted, cool off, add

2% hyposulphite of soda (sodium thiosulphate),  
and boil for another  $\frac{1}{2}$  hour; then rinse, and dry.

For staining the mixing wool, it is best to use soft water free from lime; care must also be taken that the wool to be dyed is as free from alkalies as possible.

DYEING OF SHODDY.

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A  
3

A  
4





## DYEING OF SHODDY (ALL-WOOL).

**Sorting of the Rags.** The dyeing of shoddy is considerably facilitated by previously sorting the rags and other unpulled waste wool according to their shades, keeping light and dark shades, Blues, Greens, Reds, Blacks etc. apart so that the ground shade best suited for the dyeing may always be selected. By this means the stripping of the material is frequently avoided.

**Carbonising.** The operation immediately following the sorting, except in the case of all-wool material, is the carbonising, which serves to remove any remnants of cotton in the shoddy. If the proportion of cotton is too large so that its removal would mean too great a loss in weight, the carbonising is usually avoided, the material in such case being dyed like half-wool with Diamine Colours. For particulars, see the chapter on half-wool dyeing.

The carbonising is carried out in the manner described for loose wool, with sulphuric acid (see page 21), or in special revolving drums by means of gaseous hydrochloric acid. After the carbonising, the shoddy is passed through a willowing machine or through a burr crushing machine, where the charred vegetable substances are removed. Hereafter the goods are rinsed, or to better advantage neutralised, and then dyed, being stripped if necessary before the dyeing.

**Stripping.** If light shades are to be produced on a dark ground, the latter must be removed as much as possible before the dyeing by means of suitable stripping agents. The stripping as a rule is necessary also when dyeings fast to milling are to be produced, because complaints are frequently to be traced to nothing else than the unsatisfactory fastness of the original colour of the raw material. It is advisable therefore to examine each lot for fastness to milling before dyeing, and to apply one of the following methods for stripping if the requirements in this direction are not filled.

a) Stripping with Soda.

Stripping with soda is usually adopted for coloured rags. Fragments of ladies' dresses, (bodices, jerseys etc.), usually form the bulk of such rags, and thus have been usually dyed with Acid Colours which may be removed for the greater part by a fairly strong treatment with soda. All shoddy material ought to be submitted to this treatment for removing colours of poor fastness or only moderate fastness to milling, which may bleed on milling.

Treat the goods for about  $\frac{1}{2}$  hour at 45—50° C. (110—120° F.), with

5—10% soda ash,

rinse thoroughly, and dye.

b) Stripping with Bichrome, Sulphuric Acid and Oxalic Acid.

This method is frequently used for dark-coloured material which is not stripped sufficiently by soda. Indigo and wood colours especially are stripped by this treatment, and Alizarine Colours are sometimes converted into shades more easily to be over-dyed.

Boil for  $\frac{1}{2}$ — $\frac{3}{4}$  hour with:

3— 6% bichrome,  
6—12% sulphuric acid and  
3— 6% oxalic acid,

rinse well, and dye.

It is well to commence dyeing material thus stripped without the addition of acid. For dyeing medium and full shades, with Chrome Colours, one-half the quantity of bichrome required for the after-chroming method or for the chromate method is sufficient, while the addition of bichrome may be entirely omitted for light shades.

c) Stripping with Hyraldite.

Hyraldite is now one of the favourite and most important stripping agents for shoddy. It does not affect the fibre in the least, and destroys most Acid Colours as well as a great many Chrome Colours, so that very light-coloured goods as a rule may be produced from very dark or even black material. Hyraldite offers a further great advantage in that the material does not assume a yellow tinge, which is of particular importance in the production of blues, violets, greens and light mode shades.

The stripping with Hyraldite is best carried out in a clean wooden vat; copper vessels do not affect the stripping, but are apt to cause spots on the goods.

Charge the bath at a temperature of 40—50° C. (105—120° F.) with

2 —4 % Hyraldite Z for Stripping  
2.5—5.5 % formic acid 85% or  
1 —2 % sulphuric acid of 168° Tw.,

or,

2 —4 % Hyraldite Z soluble conc.  
1 —2 % formic acid 85%;

enter the goods, raise in about ½ hour to the boil, and boil for 20 to 30 minutes. Hereafter rinse well in cold water, and with advantage also in warm water, and then dye.

Instead of Hyraldite Z for Stripping and Z soluble conc., Hyraldite A and C extra may likewise be used, the following quantities being required:

5—10% Hyraldite A or 2.5—5% C extra with  
5—10% acetic acid 30%, or, bisulphite of 64° Tw.

**Dyeing.** Carbonised and non-neutralised material, if it does not require to be stripped, is to best advantage neutralised before the dyeing, the large amount of acid contained therein causing in many instances too quick, and consequently an irregular, absorption of the dyestuff. The neutralising may be done straightaway in the dye-bath. Prepare the bath, when handwarm, in the first place with enough soda and ammonia to neutralise the acid contained in the wool (which may easily be ascertained by means of litmus paper), treat the goods for 10 to 15 minutes, then add the corresponding amount of acetic acid and dyestuff, or of dyestuff and bichrome, in the case of Acid Chrome Colours, and dye in the usual manner.

It is not necessary to neutralise in the case of the Acid Chrome Colours to be dyed directly with sulphuric acid, (see Method XI on page 13), which in such case of course are dyed without the addition of any acid.

Hyraldite should always be stored in well-closed receptacles kept in a cool, dry place. Hyraldite Z for Stripping is strewed straight into the stripping bath in a dry state, whereas the other brands are dissolved in warm water before use.

For the dyeing of shoddy, the same dyestuffs and processes as those used for loose wool generally come into consideration, so that we may in this respect refer to pages 22 and following.

Best suited for the dyeing of *Blacks* have proved

*For light or more severe milling:*

Alphanol Black	KSB	
"	KBB	} for Blue-Black
"	K4BN	
"	3BN	

*Of very good fastness to milling, particularly next to white wool:*

Anthracene Acid Black	SAS
"	SASG
"	SASN
"	SASB (for Blue-Black).

These brands are principally used for carbonised, non-neutralised material.

*Of very good fastness to milling and light:*

Anthracene Acid Black	DSF
"	DNG
Anthracene Chrome Black	F
"	5B (for Blue-Black).

*Of best fastness to milling and potting:*

Anthracene Chrome Black	1465 Z
"	PF extra
"	PPC extra
"	PPT extra
"	PBB (for Blue-Black).

*For goods to be cross-dyed:*

Anthracene Chrome Black	1465 Z	} For obtaining good fastness to acid cross-dyeing, the shoddy is to advantage stripped with Hyraldite previous to the dyeing, in order to destroy loose ground colours. For after-chroming of goods to be cross-dyed see page 37.
"	PF extra	
"	F	
"	5B (for Blue-Black)	
Anthracene Acid Black	DSF	
"	DSN	

DYEING OF SLUBBING AND YARN.

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4

A  
5



## DYEING OF SLUBBING AND YARN.

**Washing and Degreasing of Slubbing.** Before dyeing, the slubbing is wetted out evenly, as a rule in the dyeing machine itself, and if necessary degreased with some ammonia. After dyeing, it is washed in the back-wash, given a light soap passage in order to assist the further treatment, dried, and combed.

*Bleaching of Slubbing.* Slubbing is bleached like yarn either in the stoving chamber, or with bisulphite (see page 22). The bleaching is sometimes done with hydrogen peroxide or sodium peroxide, which process is described on page 51. These bleaching operations are to best advantage carried out in wooden vessels, the slubbing being worked in the form of hanks, not on bobbins. Machines made of metal, if used for bleaching purposes, should be tinned. It is however of better advantage to use the wooden apparatus supplied with a porcelain or earthenware pump which are constructed recently for the bleaching of slubbing.

**Scouring and Degreasing of Wool Yarn.** Most yarns are scalded before the washing in order to avoid felting or curling, and to keep them smooth and in good condition for reeling. The bundles of yarn are either placed in pure, boiling hot water (condensed water to best advantage), and allowed to cool therein overnight, or the yarn is stretched out in hank form on tentering frames, dipped in boiling hot water for a short time, and left to cool in the stretched state. Before the bundles are entered, they are freed from the wrapping paper, and it is also well to loosen the pack-threads a little in order to ensure a quicker and more even wetting of the yarn.

Greasy yarns, particularly cheviot, weft and knitting yarns, should be well washed after the scalding; yarns which are not scalded must also be degreased well

before dyeing. The scouring is done at 30—40° C. (95—105° F.) with the addition of about 3% soda or ammonia and 5% soap, calculated on the weight of the yarn. Yarns containing fats or oils which are difficult to saponify or entirely unsaponifiable (mineral oils) require a larger amount of soap and soda, and a higher temperature for the scouring bath; an addition of tetrapole also has a very favourable effect. The yarn is turned for about  $\frac{1}{4}$  hour in the wash liquor, rinsed well in soft water, and whizzed, after which it may be dyed.

Knitting and hosiery yarns intended to be dyed *black* are sometimes not degreased until after the dyeing, being then rinsed in a lukewarm bath containing 2% soda ash (of the weight of the yarn) and soaped at 45° C. (115° F.) in soft water (best of all condensed water) with 10% neutral soap; they are then thoroughly hydro-extracted, and dried without rinsing. The yarns treated in this manner either lose very slightly or not at all in weight; they possess a very high lustre and soft handle, and are very easy to manipulate.

**Bleaching of Wool Yarn.** Yarns are bleached according to various methods.

*Stoving.* Enter the well scoured yarns at 40—50° C. (105—120° F.) into a soap bath containing 3—8 oz neutral soap or curd soap per 10 gallons liquor, according to the hardness of the water, work well for  $\frac{1}{4}$  to  $\frac{1}{2}$  hour, throw out, whizz very evenly but not very severely, hang overnight in the stoving chamber, and dry, best in the air, in a shady place.

In order to obtain a very fine white, slight amounts of dyestuff may be added to the soap bath; particularly the following dyestuffs are used for the purpose:

Victoria Blue B	} for a milk white
Alizarine Cyanole B (for best fastness to light)	
Methyl Violet 3B—6B	} for ivory white.
Crystal Violet 10B	
Alizarine Cyanole Violet R (for best fastness to light)	

*Bleaching with Bisulphite.* This very commonly applied method is described on page 22.



*Bleaching with Permanganate and Sulphurous Acid.* By this method a finer white still is obtained than with bisulphite by itself. Work the well scoured and wetted material for  $\frac{1}{2}$  hour in a cold bath containing 3—4½ oz potassium permanganate per 10 gallons, allow to drain, and enter into a fresh bath of 3—4 lbs bisulphite of 64° Tw. and 4½—6 oz conc. sulphuric acid per 10 gallons. Place the yarns in this bath, and turn from time to time; lift after 2 hours or when the brown colour they had at first assumed has changed to a pure white. Then rinse well, blue if necessary, and dry at a moderate temperature.

*Bleaching with Hydrogen Peroxide or Sodium Peroxide* yields the clearest and most permanent white. This operation is carried out in wooden, stone, cement or earthenware vessels which should be provided with a removable lead steam-coil. Charge the starting baths per 10 gallons cold water

a) when using *hydrogen peroxide*, with  
1½—2 gallons hydrogen peroxide (commercial quality of 3%), and just enough ammonia to make the bath slightly alkaline (bluing red litmus paper just slightly);

b) when using *sodium peroxide*, with  
1 lb 5½ oz—1 lb 15 oz concentrated sulphuric acid and  
1 lb —1 lb 5½ oz sodium peroxide;  
gradually add the latter to the acidulated bath, whilst stirring, and neutralise with ammonia as above stated.

Then heat the bath to 40—50° C. (105—120° F.), enter the well scoured wool, give several turns, immerse in the liquor, and leave in the bleaching bath until the desired effect is obtained. Usually the material is entered towards evening and left overnight in the bath completely covered by the liquor. Next day it is rinsed and may then be blued in the last rinsing bath feebly acidified with acetic acid with one of the dyestuffs indicated on page 50; or, in order to increase the effect of bleaching, the material is treated for another hour in a cold bath of 4 lbs bisulphite of 64° Tw. and  $\frac{1}{2}$  lb sulphuric acid per 10 gallons, and finally blued.

The baths for the bleaching may be used over again, and to this end are acidified with just enough sulphuric acid to show a slightly acid reaction (blue litmus paper must just be reddened by the liquor); when used for subsequent lots they are freshened up with  $\frac{1}{3}$ — $\frac{1}{2}$  the quantities used for the starting bath, as above stated.

Silicate of soda may be used in the place of ammonia for neutralising the bleaching liquors; in such case the unexhausted bleaching liquors are used for giving the goods a preliminary bleach in the old baths without any further addition, the bleaching being then completed in a stronger fresh bath.

The sodium peroxide is weighed out on stone, metal, glass or porcelain, because the dry product must not come into contact with wood, paper, paste-board etc.

**Dyeing.** Slubbing is mostly dyed in the form of tops, machines being used in which the bobbins are either packed together (packing system) or are placed on cylindrical perforated tubes or in receptacles (revolvers) with perforated bottoms and front-pieces. The liquor is forced or sucked through the tops by means of a pump or other mechanical contrivance or by air pressure or vacuum.

In single cases the slubbing is dyed in machines packed in form of hanks, and occasionally also in open vessels in the hank form, but this latter system is becoming more rare every day.

There are also other kinds of dyeing machines in use, after the manner of the dye-wheels described on page 80, in which the slubbing is turned in the liquor in hank form on a winch rotating partially in the liquor.

**Woollen and Worsted Yarns** are dyed both in the open vessel and in machines, the latter being especially useful for dyeing Chrome Colours and for the production of dark Blues and Blacks with Acid Colours, while for compound shades which are dyed with easily levelling colours preference is given to dyeing in the vessel. The yarns are also dyed a great deal nowadays in form of cops and cheeses. For full instructions for machine-dyeing see the subsequent chapter dealing with this subject.

Yarns in hanks are as a rule dyed in rectangular wooden vats, a little higher than the reel of the hanks to be dyed. Open or closed steam pipes of copper or hard lead are used for heating the vats; iron pipes are less suitable. Tinned heating pipes or tinned kettles are not to be recommended, as many dyestuffs are destroyed by tin in the presence of acids.

The vertical parts of the pipes admitting and ejecting the steam are enclosed by lattice work. Over the steam-heating pipes there is placed a perforated false bottom to prevent immediate contact of the yarn with the hot

metal and to avoid any direct action of the steam on the yarn.

The vats should be of a capacity to hold a volume of liquor corresponding to about 40 times the weight of the yarn to be dyed; thus, for 100 lbs yarn about 400 gallons.

For the *Dyeing of Slubbing and Yarn*,

1. Acid Colours,
2. Anthracene Colours,
3. Diamine Colours,
4. Basic Colours and Eosines

may be used, according to the demands made.

For the dyeing, the yarn is tied together loosely, placed on smooth sticks in lots of about 5 lbs each, and turned carefully by hand or by means of a broaching stick.

Acid Colours are used in slubbing dyeing for cheapest possible shades, principally for slubbing intended for hat and fancy trimmings, embroidery and knitting yarns, and Berlin wool. For yarns, Acid Colours are used very extensively, chiefly for fancy yarns, Berlin wool, embroidery, knitting and carpet yarns.

Chrome Colours (Anthracene Colours) are given the preference for dyeings which in addition to very good fastness to light are required to possess best possible fastness to milling.

Diamine Colours are used very extensively for the production of dyeings fast to washing and milling, especially pale compound shades, yellows, reds, clarets and browns. They are especially favoured for the dyeing of knitting, hosiery and carpet yarns, as well as of yarn for the manufacture of flannels, blankets and the like.

Basic Colours and Eosines are applied mainly for Berlin wool and for bright shades e. g. bright sulphurised (stoved) colours, reds etc.

For details relating to the stripping before dyeing of yarns manufactured from coloured shoddies, see the instructions regarding the stripping of coloured shoddy on pages 43—45 of this book.

### Production of Mixtures Very Fast to Light.

The method described on page 40 for loose wool may also be applied for the dyeing of slubbing with metallic salts in dyeing machines. The wool so dyed possesses a fastness to light unattainable with other dyestuffs, and may then be used for pale mixtures of eminent resistance to light.

# DYESTUFFS FOR GREY AND MODE SHADES

## Acid Colours

Of normal Fastness:

Combinations of

Cyanole Green B, 6G	} Method I, page 4
Fast Acid Yellow TL (for light shades)	
Acid Yellow AT	
Azo Orseille BB (for light shades)	
Lanafuchsine SG, SB	
Azo Wool Violet 7R	

For light shades,  
particularly easily levelling:

Combinations of

Cyanole Green B	} Method I, page 4
Tetra Cyanole V	
Cyanole FF { for clear Greys	
Fast Acid Yellow 3G	
Orange GG	
Azo Orseille BB	

Of eminent Fastness to Light:

Combinations of

Alizarine Cyanole EF	} Method I, page 4
Alizarine Cyanole SB, SR (for full shades)	
Fast Acid Yellow 3G (for light shades)	
Fast Acid Yellow TL	
Orange GG	
Brilliant Lanafuchsine GG	
Alizarine Cyanole Violet R	

Of good Fastness to Washing  
and Milling next to Wool:

Combinations of

Tetra Cyanole A	} Method III, page 6
Brilliant Milling Green B	
Milling Yellow O	
Wool Red B	
Formyl Violet S4E	

## Diamine Colours

Of good Fastness to Washing  
and Milling next to Wool:

Combinations of

Diamine Black DN	} Method XIV, page 17
Diaminogene extra	
Diamine Yellow CP	
Diamine Brown R, M	
Diamine Catechine G	
Diamine Scarlet B, 3B	
Diamine Fast Violet FFBN	

Excellently Fast to Washing and  
Milling next to Wool, also sufficient  
for light Washing and Milling next  
to Cotton:

Combinations of

Diamine Fast Grey BN	} afterchromed. Method XIV, page 17
Diamine Fast Yellow FF	
Diamine Brown R, M	
Diamine Catechine G	
Diamine Fast Red F	

# ON SLUBBING AND YARN.

## Chrome Colours

Eminently Fast to Washing, Milling and Light:

### a) After-chroming Process:

For particularly light shades:

Combinations of

Anthracene Blue Black C,	Methods X and XI, pages 12 and 13
KG	
Anthracene Chrome Blue G	
Anthracene Yellow BN,	
RN, GG	
Anthracene Chrome	
Brown SWN, D	Method XII, page 14
Anthracene Chrome Red A	
Anthracene Chrome	
Violet B	

For medium and deep shades:

Combinations of the above  
and the following dyestuffs:

Anthracene Blue Black	Methods X and XI, pages 12 and 13
BG, BE	
Anthracene Chrome Blue	
F, BB	
Anthracene Chrome	Method XIII, page 15
Brown SWR, DWN	

### b) Chromate Process:

For particularly light shades:

Combinations of

Chromate Blue Black B	Method XII, page 14
Anthracene Blue Black C	
Anthracene Chromate	
Grey KB	
Anthracene Yellow BN,	
RN, GG	
Anthracene Chromate	Method XII, page 14
Brown EB, ER, 3G	
Anthracene Chromate	
Violet XB	

For medium and deep shades:

Combinations of the above  
and the following dyestuffs:

Anthracene Chromate	Method XII, page 14
Grey G	
Anthracene Chromate	
Blue XR	
Anthracene Chromate	Method XIII, page 15
Brown WS, WG	

### c) On Chromed Wool:

For particularly light shades:

Combinations of

Anthracene Blue Black	Method XIII, page 15
C, KG	
Anthracene Yellow BN, RN	
Anthracene Chrome	
Brown D	Method XIII, page 15
Anthracene Chrome Red A	
Anthracene Chrome	
Violet B	

For medium and dark shades:

Combinations of dyestuffs as per  
opposite column and the following:

Anthracene Blue Black	Method XIII, page 15
BG, BE	
Anthracene Chrome	
Blue G, BB	
Anthracene Yellow C	Method XIII, page 15
Anthracene Chromate	
Brown EB, WS, WG	

Fast to Potting and Cross-Dyeing:

Combinations of

Anthracene Blue Black BE, BG	Anthracene Chrome
Anthracene Chrome Blue F, G	Brown SWN, D
Anthracene Yellow C	Anthracene Chrome Red A

Method X, page 13.

For subsequent shading see page 16.

Acid Colours

Of normal Fastness:

Combinations of

Cyanole Green B, 6G	} Method I, page 4
Acid Yellow AT	
Orange II, extra, GG (for reddish Browns and Prune)	
Lanafuchsin SG	
Brilliant Lanafuchsin BB, GG	
Azo Wool Violet 7R (for Prune)	

Of eminent Fastness to Light:

Combinations of

Alizarine Cyanole SR	} Method I, page 4
Fast Acid Yellow TL	
Acid Yellow AT (as a very strong Yellow)	
Orange GG (for reddish Brown and Prune)	
Brilliant Lanafuchsin GG	
Alizarine Cyanole Violet R (for Prune)	

Of good Fastness to Washing  
and Milling next to Wool:

Combinations of

Tetra Cyanole A	} Method III, page 6
Brilliant Milling Green B	
Milling Yellow O	
Wool Red B	
Formyl Violet S4B	

Diamine Colours

Of good Fastness to Washing  
and Milling next to Wool:

Combinations of

Diamine Brown 3G, R, M, B	} Method XIV, page 17
Diamine Catechine G	
Diamine Yellow CP	
Diamine Scarlet B, 3B	
Diamine Black DN	
Diaminogene extra	
Diamine Fast Violet FFBN	
Oxy Diamine Violet B	

Excellently Fast to Washing and

Milling, also sufficient for light

Washing and Milling next to

Cotton:

Combinations of

Diamine Brown R, M, B	} after-chromed. Method XIV, page 17
Diamine Catechine G	
Diamine Fast Yellow FF	
Diamine Fast Red F	
Diamine Fast Grey BN	

## Chrome Colours

### Eminently Fast to Milling and Light:

#### a) After-chroming Process:

##### Combinations of

Anthr. Chrome Brown SWN.	} Methods X and XI, pages 12 and 13
SWR, D, DWN, DW, KDR	
Anthracene Chromate Brown EB	
Anthracene Yellow BN, RN	
Anthracene Orange G	
Anthr. Chrome Red A, G	
Anthr. Blue Black BG, BE, KG	
Anthr. Chrome Blue BB, F, R	
Anthracene Chrome Violet B	(for Prune)

##### Cheaper Method of Production.

##### Combinations of

Anthracene Acid Brown	} Methods X and XI, pages 12 and 13
R, N, B, G	
Anthr. Chrome Brown DWN	
Anthr. Chromate Brown EB	
Anthracene Yellow BG	
Anthracene Chrome	
Black PPC extra	
Anthr. Acid Black DSF	
Anthracene Chrome	} Methods X and XI, pages 12 and 13
Violet B (for Prune)	

#### b) Chromate Process:

Anthr. Chromate Brown EB,	} Method XII, page 14
ER, WS, WG, 3G	
Anthr. Yellow BN, RN	
Anthracene Orange G	
Anthr. Chrome Red A, G	
Anthracene Blue Black B	
Anthr. Chromate Grey KB, G	
Anthr. Chromate Blue XR	
Anthr. Chromate Violet XB	(for Prune)

##### Cheaper Method of Production.

##### Combinations of

Anthracene Chromate	} Method XII, page 14
Brown EB, ER, 3G	
Anthracene Acid Brown B	
Anthracene Yellow BG	
Anthracene Chromate	
Grey G	
Anthracene Chromate	
Violet XB (for Prune)	

#### c) On Chromed Wool:

##### Combinations of

Anthracene Chromate Brown	Anthracene Chrome Red A
EB, WS, WG	Anthracene Blue Black
Anthracene Chrome Brown	BE, BG, KG
DWN, KDR	Anthracene Chrome Blue BB
Anthracene Yellow BN, RN, C	Anthracene Chrome Violet B
	(for Prune).

Method XIII, page 14.

### Fast to Potting and Cross-Dyeing:

##### Combinations of

Anthracene Chrome Brown	Anthracene Blue Black BE
SWN, D	Anthracene Chrome Blue F
Anthracene Yellow C	Anthracene Chrome Black
Anthracene Chrome Red A	PPC extra.

Method X, page 12.

For subsequent shading see page 16.



# DYESTUFFS FOR YELLOW, ORANGE AND

## Acid Colours

Yellow and Orange.  
Of normal Fastness:

China Yellow B Naphtol Yellow S Acid Yellow AT Fast Yellow S Metanil Yellow Orange IV Tropaeoline O, OO Indian Yellow G, FF, R Orange II, extra, R, EN	}	for bright Yellows  Method I, page 4 for Orange EN Method II, page 6
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Of excellent Fastness to Light:

Fast Acid Yellow 3G, TL (the 3G brand eminently Orange GG	}	Method I, page 4 good)
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For very bright Oranges without  
particular Fastness:

Combinations of		
Naphtol Yellow S Acid Yellow AT Rosazeïne B	}	Method I, page 4
or, particularly for yarn, also		
Thioflavine T, TCN Rosazeïne B	}	Method XV, pag. 16 and 72

Of good Fastness to Washing and  
Milling next to Wool and Cotton:

Milling Yellow O Milling Red G Rosazeïne B	}	Method III, page 6
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Pink.

Rosazeïne B, Method III,  
pages 6 and 72.  
Eosine Colours, all brands,  
Method IX, page 11.

Of good Fastness to Washing and  
Milling next to Wool and Cotton:

Rosazeïne B, Method III,  
pages 6 and 72.

## Diamine Colours

Of good Fastness to Milling  
next to Wool:

Yellow and Orange.

Thioflavine S Diamine Yellow CP Diamine Fast Yellow  Diamine Orange F Diamine Orange B Oxy Diamine Orange G, R  Diamine Yellow CP Diamine Scarlet B Diamine Purpurine B Diamine Fast Red F	}	FF, 3G  or, combinations of  Method XIV, page 17
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or such of

Milling Yellow O Diamine Scarlet B	}	Method III, page 6
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Pink.

Diamine Rose GD, BD,  Diamine Scarlet B, 3B brightened with Rosazeïne B	}	FFB  Method XIV, page 17
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The following dyestuffs yield  
dyeings particularly fast to light:

Diamine Yellow CP  
 Diamine Fast Yellow FF, 3G  
 Diamine Orange F  
 Diamine Scarlet B, 3B  
 Diamine Fast Red F  
 Diamine Rose GD, BD  
 Milling Yellow O.



# PINK ON SLUBBING AND YARN.

## Chrome Colours

Eminently Fast to Washing, Milling and Light:

### a) After-chroming Process:

Yellow and Orange.

Anthracene Yellow GG, fixed with chromium fluoride:	} Methods X and XI, pages 12 and 13
Anthracene Yellow BN, RN, C	
Anthracene Orange G	
combined with Diamine Fast Red F Anthracene Chrome Red A, G	

Pink.

Diamine Fast Red F	} Method XIV, page 17
brightened with	
Rosazeïne B	

For duller Shades:

Anthracene Chrome Red	} Method XI, page 13
A	
brightened with Rosazeïne B	

### b) Chromate Process:

Yellow and Orange.

Anthracene Yellow BN, RN, C, GG	} Method XII, page 14
Anthracene Orange G	
combined with Diamine Fast Red F Anthracene Chrome Red G	

Pink.

Diamine Fast Red F	} Method XII, page 14
brightened with	
Rosazeïne B	

For duller Shades:

Anthracene Chrome Red	} Method XII, page 14
G	
brightened with Rosazeïne B	

### c) On Chromed Wool (only for Yellow and Orange):

Anthracene Yellow BN, RN, C, GG	} Method XIII, page 15.
Anthracene Orange G	
combined with	
Diamine Fast Red F	
Anthracene Chrome Red A, G	

Fast to Potting and Cross-Dyeing:

Anthracene Yellow C	} Method X, page 12.
shaded with	
Diamine Fast Red F	
Anthracene Chrome Red A	

For subsequent shading see page 16.

## Acid Colours

### Red and Claret.

#### Of normal Fastness:

Brilliant Scarlet GG—6R  
Crystal Scarlet 6R  
Scarlet FR, F2R, F3R  
Brilliant Cochineal 2R, 4R  
Naphtol Red EB, C  
Amaranth, Azo Rubine A  
Azo Red A, Roccelline

Method II, page 5

Azo Orseille BB  
Lanafuchsine SG, SB,  
BBS, 6B

Method I, page 4

Acid Magenta  
further, for very fiery Reds  
Rosazeine B, combined with  
Orange R, extra, or  
Acid Yellow AT

Method I, page 4

#### Of excellent Fastness to Light:

Brilliant Croceine,  
all brands  
Croceine AZ  
Brilliant Lanafuchsine  
GG, SL, BB  
(eminently fast to light)  
Method I, page 4.

Method II,  
page 5

#### Of good Fastness to Washing and Milling next to Wool and Cotton:

Milling Red G, FR  
shaded with  
Rosazeine B  
Milling Yellow O  
Formyl Violet S4B

Method III,  
page 6

#### Of good Fastness to Washing and Milling next to Wool:

Wool Red B, shaded like  
Milling Red,  
Method III, page 6.

Continued in next column.

## Diamine Colours

### Of good Fastness to Washing and

#### Milling next to Wool:

### Red and Claret.

Diamine Scarlet B, 3B  
Diamine Red 4B, 6B, 10B  
Diamine Purpurine B,  
3B, 6B  
Diamine Fast Red F  
Diamine Bordeaux B, S  
Diamine Brilliant

Method XIV, page 17

Bordeaux R  
shaded with  
Diamine Yellow CP  
Diamine Fast Violet  
FFBN, FFRN  
Oxy Diamine Violet B

### Violet.

Diamine Fast Violet  
FFBN, FFRN  
Diamine Violet N  
Oxy Diamine Violet B  
brightened with  
Alkaline Violet CA  
Brilliant Milling Blue B

Method XIV,  
page 17

## Acid Colours

### Violet.

Acid Violet 6BS, 4RS  
Azo Wool Violet 7R, 4B  
Azo Fast Violet 2R  
Aliz. Cyanole Violet R  
(eminently fast to light)  
Lanacyl Violet BF, B

Method I,  
page 4

Method III, page 6.

#### Of good Fastness to Washing and Milling next to Wool and Cotton:

Formyl Violet S4B, 4BF,  
S5B, 6B  
Method III, page 6.

Regarding fastness to steaming,

# VIOLET ON SLUBBING AND YARN.

## Chrome Colours

### Eminently Fast to Milling and Light:

#### a) After-chroming Process:

Red and Claret.

Diamine Fast Red F	} Method X and XI, page 12 and 13
Anthracene Chrome Red G	
Anthracene Chrome Red A	
shaded with	
Anthracene Yellow C, BN, RN	
Anthracene Orange G	
Anthracene Chrome Violet B	

Violet.

Anthracene Chrome	} Methods XI or X, resp. pag. 13 and 12
Violet B	
brightened with	
Formyl Violet S4B, 4BF	
Brilliant Milling Blue B	

#### b) Chromate Process:

Red and Claret.

Anthracene Chrome Red	} Method XII, page 14
G	
Diamine Fast Red F	
shaded with	
Anthracene Yellow C, BN, RN	
Anthracene Orange G	
Anthr. Chromate Violet XB	

Violet.

Anthracene Chromate	} Method XII, page 14
Violet XB	
brightened with	
Formyl Violet S4B, 4BF	
Brilliant Milling Blue B	

#### c) On Chromed Wool:

Red and Claret.

Diamine Fast Red F	} Method XIII, page 15
Anthracene Chrome Red	
A, G	
shaded with	
Anthracene Chrome Violet B	

Violet.

Anthracene Chrome	} Method XIII, page 15
Violet B	
Anthracene Acid Blue RR	
brightened with	
Formyl Violet S4B, 4BF	
Brilliant Milling Blue B	
Wool Red B	

### Fast to Potting and Cross-Dyeing:

Diamine Fast Red F	} Method X, page 12.
Anthracene Chrome Red A	
shaded with	
Anthracene Yellow C	
Anthracene Chrome Blue F	

For subsequent shading see page 16.

## Acid Colours

### For Bright Blues

#### Of normal Fastness:

Cyanole FF, extra  
Tetra Cyanole V, SF,  
Cyanole Navy Blue KR

Method I,  
page 4

#### Of eminent Fastness to Light:

Alizarine Cyanole EF  
Alizarine Cyanole B  
(for Light Blue)  
Alizarine Cyanole  
SR, SBR, SB, SG

Method I,  
page 4

#### Of good Fastness to Washing and

#### Milling next to Wool and Cotton:

Brilliant Milling  
Blue B  
Formyl Blue B  
Tetra Cyanole A

Method III,  
for Tetra  
Cyanole  
also I, pages 6  
and 4 resp.

#### Of better Fastness to Light:

Alkaline Blues, all brands  
Method VIII, page 11.

The dyeings produced with  
Alkaline Blues must be soured off  
after an alkaline washing.

### For Navy and Dark Blue.

#### Of normal Fastness:

Azo Wool Blue SER, SE, 6B  
Acid Navy Blue KP, A  
Azo Navy Blue B, 3B  
Brilliant Naphtol Blue  
4B, B, R

Method I, p. 4

#### Of very good Fastness to Light:

Azo Fast Blue, all brands  
Methods I, page 4.

#### Excellently Fast to Light:

Peri Wool Blue B,  
BG, G  
Fast Navy Blue B, G

Method  
II,  
page 5

Lanacyl Blue BB, R  
Lanacyl Blue BN, RN  
(eminently good)

Method  
III,  
page 6

#### For Cheaper Dark Blues.

Lanacyl Navy Blue  
B, BB  
Naphtol Blue G

Method III,  
page 6

#### Of very good Fastness to Washing and Milling, and excellent Fastness to Light:

Alphanol Blue GN, BR extra,  
5RN, Method VII, page 10.

### Dyestuffs for shading.

#### Of normal Fastness:

Azo Wool Violet 4B  
Acid Violet 6BS  
Cyanole Green B, 6G  
Orange extra  
Fast Acid Yellow TL  
Alkaline Violet CA  
(for Alkaline Blue)

#### Of very good Fastness to Light:

Azo Fast Violet 2R  
Alizarine Cyanole Violet R  
(eminently fast to  
light)  
Cyanole Fast Green G  
Orange GG  
Fast Acid Yellow 3G, TL  
Azo Wool Violet 7R

#### Of very good Fastness to Washing:

Formyl Violet, all brands  
Brilliant Milling Blue B  
Brilliant Milling Green B  
Milling Yellow O  
Anthracite Black B

# ON SLUBBING AND YARN.

## Chrome Colours

Eminently Fast to Washing, Milling and Light:

### a) After-chroming Process:

Anthracene Chrome Blue F, FR, BB, G, B, R Anthracene Acid Blue EB, ER, KBR shaded with Formyl Violet S4B, 4BF Brilliant Milling Blue B Formyl Blue B Tetra Cyanole A Brilliant Milling Green B Anthracene Chrome Violet B	} Methods X and XI, pages 12 and 13
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Cheaper Navy and Dark Blues:

Azo Chrome Blue T, TB, AI Anthracene Blue Black BE Anthracene Chrome Black PPC extra, F, PBB shaded as stated above	} Methods X and XI, page 12 and 13
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### b) On Chromed Wool:

Anthracene Chrome Blue RRW extra, BW extra, BB, G, R Anthracene Acid Blue EB, ER, KBR, RR shaded with Formyl Violet S4B, 4BF Brilliant Milling Blue B Brilliant Milling Green B Anthracene Chrome Violet B	} Method XIII, page 15
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### c) Chromate Process:

Anthracene Chrome Blue RRW extra shaded with Formyl Violet S4B, 4BF Brilliant Milling Blue B Formyl Blue B	} Method XII, page 14.	} Anthracene Chromate Blue XR shaded with Tetra Cyanole A Brilliant Milling Green B Anthracene Chromate Violet XB.
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Fast to Potting and Cross-Dyeing:

Anthracene Chrome Blue F Anthracene Chrome Blue G Anthracene Chrome Blue BB	} Method XI, page 13
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For subsequent shading see page 16.

## Acid Colours

### Of normal Fastness:

#### Combinations of

Cyanole Green B, 6G Acid Green, all brands (chiefly for bright Greens) Acid Yellow AT Tropaeoline OO Orange II, extra, IV Azo Orseille BB Azo Wool Blue 6B Tetra Cyanole V	}	Method I, page 4
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### Of better Fastness to Light:

Cyanole Fast Green G Fast Acid Yellow TL Acid Yellow AT (as a strong Yellow) Orange GG Brilliant Lanafuchsine GG Azo Fast Blue BD	}	Method I, page 4
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### Eminently Fast to Light:

Alizarine Brilliant Green G Naphtol Green B Fast Acid Yellow 3G, TL Orange GG Brilliant Lanafuchsine GG Alizarine Cyanole EF, SR Cyanole Fast Green G (for brightening)	}	Method III, for Naphtol Green II, pages 6 and 5
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### Of good Fastness to Washing:

Cyanole Fast Green G Naphtol Dark Green G Milling Yellow O Wool Red B Tetra Cyanole A	}	Method III, page 6
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(Continued in opposite column).

## Diamine Colours

### Of good Fastness to Washing and Milling next to Wool:

#### Combinations of

Diamine Green FG, G, CL Diamine Dark Green N Diamine Yellow CP Diamine Brown 3G, R Diamine Scarlet B	}	Method XIV, page 17
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### Excellently Fast to Washing and Milling next to Wool, also sufficient for light Washing and Milling next to Cotton.

#### Combinations of

Diamine Green G Diamine Fast Yellow FF Diamine Catechine G Diamine Brown R Diamine Fast Red F	}	aftertreated with chromium fluoride, Method XIV, page 17
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## Acid Colours

### Of good Fastness to Washing and Milling next to Wool and Cotton:

#### Combinations of

Brilliant Milling Green B Milling Yellow O Milling Red G Formyl Blue B	}	Method III, page 6
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The shades produced with Brilliant Milling Green B become lighter by a severe alkaline treatment, but by subsequent souring off the original tone will reappear.

Regarding fastness to steaming,

# ON SLUBBING AND YARN.

## Chrome Colours

Eminently Fast to Washing, Milling and Light:

### a) After-chroming Process:

Combinations of

Alizarine Brilliant	Methods X and XI, pages 12 and 13
Green G, SE	
Anthracene Chromate	
Green KFF extra	
Anthracene Chrome Blue	
G, BB	
Anthracene Yellow	Method X, page 12
BN, RN, GG, C	
Anthracene Chrome	
Brown D, DWN, SWN	

Bright Greens:

Alizarine Brilliant	Method XII, page 14
Green G, SE	
shaded with	
Anthracene Yellow BN, GG	
Brilliant Milling Green B	Method XIII, page 15
(for brightening)	

### b) Chromate Process:

Combinations of

Alizarine Brilliant	Method XII, page 14
Green G, SE	
Anthracene Chromate	
Green KFF extra, B	
Chromate Blue Black B	
Anthracene Chromate	
Blue XR	Method XII, page 14
Anthracene Yellow	
BN, C, GG	
Anthracene Chromate	
Brown EB, WS, WG	Method XII, page 14

Bright Greens:

Alizarine Brilliant	Method XII, page 14
Green G, SE	
shaded with	
Anthracene Yellow BN, GG	
Brilliant Milling Green B	Method XIII, page 15
(for brightening)	

### c) On a Chrome Mordant:

Combinations of

Alizarine Brilliant	Method XIII, page 15
Green G, SE	
Anthracene Chromate	
Green KFF extra	
Anthracene Chrome	
Blue G, BW extra	
Anthracene Yellow	Method XIII, page 15
C, BN, GG	
Anthracene Chromate	
Brown EB, WS, WG	

Bright Greens:

Alizarine Brilliant	Method XIII, page 15
Green G, SE	
Anthracene Chromate	
Green KFF extra	
shaded with	Method XIII, page 15
Anthracene Yellow BN, GG	
Brilliant Milling Green B	
(for brightening)	

Fast to Potting and Cross-Dyeing:

Combinations of

Anthracene Chrome Blue G, BB	Anthracene Chrome Brown
Anthracene Yellow C	D, SWN

Method X. page 12.

For subsequent shading see page 16.



**Acid Colours (Direct Acid Blacks of very good Fastness to Light)**

Simplest and cheapest manner  
of production.

Bluish Blacks:

Naphtylamine Black ES8B, ES5B, ES3B, ESN, 7BS, 4BS, S, SGG	} Method II, page 5
Naphtylamine Blue Black 5B	
Naphtol Black 6B, 3B, 2B Naphtol Blue Black S	
Naphtylamine Black 4B, 6B	} Method IV, page 7

More covered Blacks:

Naphtylamine Black HWN, T, TJ, TN, SS2B, SS3B	} Method II, page 5
Naphtylamine Blue Black B	
Naphtol Black B, SG	
Naphtylamine Black X2B, X3B, OO	} Method IV, page 7

Particularly easily levelling:

For Blue Black: Azo Merino Black 8B, 6B, 6BE, 6BN, 3BN	} Method I, page 4
For Jet Black: Azo Merino Black B, BE, BN	

Dyestuffs for shading:

Acid Violet 6BS Brilliant Milling Blue B Tetra Cyanole V Cyanole Green B, 6G	} for very bluish Blacks
Acid Yellow AT Tropaeoline OO Orange II, extra	

Of good Fastness to Washing and  
Milling next to Wool and Cotton.

Bluish Blacks:

Alphanol Black BG, 3BN, KBB, KSB	} Method V, page 8
More covered Blacks: Alphanol Blacks KWAN conc., KV, R	

Of good Fastness to Washing and  
Milling next to Wool:

Naphtyl Blue Black N, FBB  
Method VI, page 9.

Sufficient for less severe demands  
for Fastness to Washing:

Bluish Blacks: Naphtylamine Black 4B, 6B	} Method IV, page 7
More covered Blacks: Naphtylamine Black X2B, X3B	

Dyestuffs for shading:

Formyl Violet, all brands Brilliant Milling Blue B Formyl Blue B Brilliant Milling Green B	} for very bluish Blacks
Milling Yellow O Tropaeoline O, for Naph- tylamine Black 4B	



# ON SLUBBING AND YARN.

## Chrome Colours

Of very good Fastness to Washing,  
Milling and Light.

Bluish Blacks:

Anthracene Chrome Black  
F, 5B

More covered Blacks:

Anthracene Chrome  
Black FE

Cheap Blacks:

Anthracene Acid Black  
DSF, DSN, DSFB,  
DNG (for Blue Black)

Method X, page 12

Particularly easily levelling:

Anthracene Chrome  
Black SR, SRG  
Anthracene Acid Black  
SBB (for Blue-Black)

Method XI,  
page 13

Anthracene Acid Black SR,  
SRG and SBB are very fast to  
milling, particularly next to wool;  
the rest of the dyestuffs are very  
fast to milling also next to cotton.

Dyestuffs for shading:

For very bluish Blacks.

Formyl Violet S4B, 4BF, S5B  
Brilliant Milling Blue B  
Brilliant Milling Green B.

For Jet Black:

Anthracene Yellow C, BN  
Anthracene Orange G.

Eminently Fast to Milling,  
Potting and Light.

Bluish Blacks:

Anthracene Chrome Black  
PPN extra, PPC extra,  
KV, P extra, PF extra,  
PFB extra, PPS extra  
and PBB (very bluish)

More covered Blacks:

Anthracene Chrome Black  
PPT extra, PFR extra,  
PR extra

Method X, page 12

Dyestuffs for shading:

Anthracene Blue  
Black BE } for  
Blue-Black  
Anthracene Yellow C }  
Anthracene Orange G } for  
Anthracene Chrome } Jet Black  
Red A }

For Goods to be Cross-dyed, the  
following Dyestuffs come into  
consideration:

Bluish Blacks:

Anthracene Chrome  
Black P extra, PF  
extra, PFB extra,  
F, 5B

Method X, page 12

More Covered Blacks:

Anthracene Acid Black  
DSF, DSN

In order to obtain good fast-  
ness to cross-dyeing. it is well to  
give a stronger chroming than  
usual, viz. by applying

for 4% dyestuff	1.5% bichrome
„ 5% „	2% „
„ 6% „	2.5% „
„ 7% „	and more 3% bichrome.

For subsequent shading see page 16.

Special Properties of Fastness of the Dyestuffs Enumerated  
in the Tables on Pages 54—67.

*Dyestuffs Fast to Steaming.*

The dyestuffs enumerated in the tables possess very good fastness to steaming, with the exception of the following products, which are changed more or less in shade on severe steaming, but resist normal steaming:

Brilliant Croceïne 6B, 7B,	Alphanol Black,	} dyed without copper sulphate
Croceïne AZ [9B	all brands	
Eosine BN	Naphtyl Blue Black,	
Eosine Scarlet B	all brands	
Erythrosine, all brands	Diamine Brown 3G, R	
Rose Bengale extra N	Diamine Catechine G	
Lanacyl Violet B, BF	Diamine Red 4B, 10B	
Lanacyl Blue, all brands	Diamine Fast Violet	
Lanacyl Navy Blue BB	FFBN, FFRN	
Peri Wool Blue B, BG	Oxy Diamine Violet B	
Fast Navy Blue B, G	Diamine Green B, CL	
Alphanol Blue, all brands	Diamine Black DN	
Naphtol Green B	Diaminogene extra	
Naphtylamine Black 4B,	Diamine Fast Grey BN	
X2B, X3B, OO	Anthracene Chrome Red G	
	Anthracene Chromate	
	Green B	
	Thioflavine T, TCN.	

*Dyestuffs Fast to Carbonising.*

The dyestuffs named in the tables, with the exception of

Tropaeoline OO	} change but slightly in shade, and in most cases are satisfactory	Eosine, all brands
Orange IV		Acid Violet 4RS
Lanafuchsine 6B		Peri Wool Blue,
Azo Wool Violet		all brands
7R		Oxy Diamine Orange G, R
Fast Navy Blue B		Diamine Brilliant
Lanacyl Blue		Bordeaux R
BB, R		Diamine Black DN
		Thioflavine T. TCN.

By carbonising, the effect of the copper sulphate on the following dyestuffs is neutralised:

Alphanol Black, all brands      Naphtyl Blue Black,  
all brands.

Good neutralising after the carbonising is required for:

Metanil Yellow	Diamine Brown R
Indian Yellow R	Diamine Purpurine
Naphtol Dark Green G	Diamine Red
Azo Merino Black 8B, 6B,	Diamine Bordeaux B
6BE, B, BE	Anthracene Orange G
Thioflavine S	Anthracene Chrome Red G.
Diamine Fast Yellow 3G	

*Dyestuffs Fast to Stoving.*

Of the dyestuffs mentioned in the tables, the following possess very good fastness to stoving:

*China Yellow B	Azo Wool Violet 7R, 4B
*Naphtol Yellow S	Acid Violet 6BS, 6BC*
Fast Acid Yellow TL, 3G*	Formyl Violet S4B,
Acid Yellow AT	S5B, 4BF
Milling Yellow O	Alkaline Violet CA
*Indian Yellow, all brands	Alizarine Cyanole Violet R
Orange GG, II*, extra*,	Formyl Blue B
R*, EN*, ENZ*	Brilliant Milling Blue B
Brilliant Cochineal 2R, 4R	*Cyanole FF, extra
Brilliant Scarlet GG*, G	Alizarine Cyanole,
Scarlet FR, F2R, F3R	all brands
Azo Orseille BB	Tetra Cyanole V*, SF*,
Lanafuchsine SB, BBS,	extra*, A
6B, SG*	Cyanole Navy Blue KR
Brilliant Lanafuchsine BB,	Azo Navy Blue B, 3B
SL, GG*	Azo Wool Blue SE
Azo Rubine A	Brilliant Naphtol Blue
Azo Red A	4B, B, R
*Rosazeïne B	Cyanole Green B, 6G
*Eosine	Cyanole Fast Green G
*Erythrosine	Brilliant Milling Green B
	Alizarine Brilliant Green G
*Eosine Scarlet B	*Naphtol Blue Black
*Phloxine S	Naphtol Blue Black S*, BN
*Rose Bengale extra N	Naphtylamine Black ES8B,
	ES5B, ES3B

Naphtylamine Blue	Anthracene Chrome Red A
Black 5B	Anthracene Chrome Violet B
Azo Merino Black 8B*,	Anthracene Chromate Violet XB
6B*, 6BE*, 6BN, 3BN,	Anthracene Chromate Blue XR
B*, BE*	Anthracene Chrome } all brands
Thioflavine S	Anthracene Acid Blue
Diamine Fast Yellow FF	Azo Chrome Blue
Diamine Yellow CP	*Anthracene Acid Blue RR
Diamine Orange F	Alizarine Brilliant Green G, SE
Oxy Diamine Orange G	Anthracene Chromate Green KFF extra, B
Diamine Brown M, B	Anthracene Blue Black, all brands
Diamine Fast Red F	Anthracene Chromate Grey G, KB
Diamine Purpurine } all brands	Anthracene Chrome Black, all brands except FE
Diamine Rose } all brands	Anthracene Acid Black DNG, SR, SRG, SBB
Diamine Brilliant	
Bordeaux R	
Diamine Violet N	
Oxy Diamine Violet B	
Diamine Green,	
all brands	
Diamine Dark Green N	
Anthracene Chromate	
Brown ER	

The following are fairly fast to stoving, and in most cases satisfactory:

*Tropaeoline O	Diamine Orange B
Brilliant Scarlet R, 6R	Oxy Diamine Orange R
Crystal Scarlet 6R	Diamine Brown 3G
*Brilliant Croceïne R	Diamine Scarlet 3B
*Roccelline	Diamine Red 4B, 6B, 10B
Milling Red G	Diamine Fast Violet
*Formyl Violet 6B, 8B, 10B	FFBN, FFRN
Naphtol Green B	Anthracene Yellow C, GG
Naphtol Dark Green G	Anthracene Chrome Brown DW, SWN, SWR
*Naphtylamine Black ESN,	Chromate Blue Black B
HWN	Anthracene Acid Black
Naphtylamine Blue Black B	DSF, DSN, DSFB
Naphtol Black 3B, 6B	Anthracene Chrome Black FE
Azo Merino Black BN	

The dyestuffs marked with an asterisk (\*) are under certain conditions apt to bleed slightly on stoving on to white wool next to the dyed yarn.

## Dyestuffs withstanding the Bleaching with Hydrogen Peroxide or Sodium Peroxide.

For worsted shots which are interwoven with wool or cotton, and are intended to withstand the bleaching of the goods with hydrogen peroxide or sodium peroxide, the following dyestuffs are best suited:

Milling Yellow O	Diamine Brilliant	
Tetra Cyanole A (in light shades)		Bordeaux R
Cyanole Fast Green G (subse-	Diamine Bordeaux S	
quently treated with tannic	Diamine Fast Violet FFBN	
acid according to the directions	Diamine Sky Blue FF	
for piece-goods),	Diamine Blue RW, 3B	
Alphanol Blue	Diamine Green FG, G, B	
all brands	Diaminogene extra	
Alphanol Black,	Diamine Black DN	
all brands, except R	Diamine Fast Grey BN	
Anthracite Black B, R	Anthracene Yellow C	
Thioflavine S	Anthracene Acid	
Diamine Yellow CP	Brown R, N, B	} after- chromed
Diamine Fast Yellow FF	Alizarine Brilliant	
Diamine Orange B	Green G	
Diamine Brown M, B	Anthracene Acid Blue EB, ER	
Diamine Rose BD, GD	after-chromed or dyed on chromed	
Diamine Red 4B, 6B		wool
Diamine Purpurine B, 3B, 5B	Anthracene Chrome Blue G,	
Diamine Fast Red F	BB, R on chromed wool	
	Anthracene Acid Black DSF,	
	after-chromed.	

## Chloring of Wool; Production of Silk-Wool.

By treating wool with solutions of chloride of lime and dilute acid, the fibre assumes an increased lustre and is less liable to shrink or felt. At the same time its affinity for most dyestuffs is considerably enhanced, which property may be taken advantage of in producing two-coloured effects on all-wool piece-goods, according to our patented process described in British Patent No. 144729s.

By a subsequent soaping, a very soft handle is imparted to the chlored and dyed wool, and by soaping and subsequently souring off, the wool assumes a scroop similar to that of silk. Both these methods are frequently applied for the production of so-called "*silk-wool*", particularly for knitting and hosiery yarns.

The chlorination is carried out in the following manner:

The well wetted or, if necessary, scoured yarn is

1. treated for  $\frac{1}{4}$  hour in a cold bath containing  $1\frac{1}{2}$  gallons hydrochloric acid of 35° Tw. per 100 gallons liquor; the yarns are then allowed to drain well or are whizzed lightly and entered without rinsing into
2. a cold bath\* prepared with 15—20% chloride of lime of the weight of the goods and titrating about 0.4—0.8 deg. Tw.; in this liquor the goods are turned frequently for  $\frac{1}{2}$  hour, and are then
3. taken again into the first hydrochloric acid bath (1), where they are treated for about 20 minutes; finally they are rinsed very well.

In order to remove the smell and the yellow tone of the wool caused by the chloring process, the yarn is treated finally for 15 to 20 minutes in a lukewarm bath containing about  $\frac{1}{2}$  lb bisulphite of soda 64° Tw. per 10 gallons liquor and then rinsed before dyeing.

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\* Preparation of the Chloride of Lime Solution: Dry chloride of lime containing 35% of chlorine is mixed to a uniform paste with five times its weight of cold water; fifteen times the weight of water is then added, the whole being allowed to settle and the clear solution used.

The dyestuffs are much more readily absorbed by chlorinated than by unchlorinated wool. It is therefore advisable to start dyeing without any acid, particularly in the case of dyestuffs which go easily on to the fibre, and to add some acid subsequently, if necessary, for exhausting the bath. It is also recommended to enter the yarn at a lower temperature than usual.

After dyeing, the yarn is rinsed well, hydroextracted, and then either soaped and soured off, or soaped only.

*Slubbing* is chlorinated in the following manner in apparatus: Charge the chloring bath, according to the quality of the slubbing, with 15—20% chloride of lime reckoned on the weight of the goods and add sufficient hydrochloric acid to render the liquor neutral to litmus. Enter the slubbing, well wetted, but not acidified, run for  $\frac{1}{4}$  hour, then gradually add 1 lb hydrochloric acid per 10 gallons liquor, and run for another  $\frac{1}{4}$  hour after adding the last portion of hydrochloric acid. Rinse for 10 minutes, treat for 15 to 20 minutes in a cold bath of  $1-1\frac{3}{8}$  lb bisulphite of  $64^{\circ}$  Tw. per 10 gallons liquor, rinse again thoroughly, and dye.

#### *Producing a Silky Scroop:*

Treat the chlorinated yarn for 10 minutes in a cold soap bath containing 8 oz olive-oil soap per 10 gallons liquor, sour off lightly with hydrochloric or sulphuric acid, whizz, and dry.

#### *Producing a Very Soft Handle:*

Prepare a concentrated cold bath with

$\frac{3}{4}$ —1 lb olive-oil soap	} per 10 gallons liquor;
$1\frac{1}{2}$ —3 oz olive-oil	
1 oz ammonia of $0.913$ spec. grav.	

after chlorinating, treat the yarn for 10—15 minutes in this bath, whizz, and dry.

Yarns for knit goods are frequently chlorinated for the purpose only to overcome their tendency to felt or shrink while there is no desire to enhance their brilliancy. Yarns of this kind are chlorinated in the same way as indicated for silk-wool, but in hydrochloric acid and chloride of lime baths of only half the strength. The after-treatment with bisulphite may in such case also be omitted.

## Stoved or "Sulphured" Colours on Wool Yarn.

In order to produce these colours, the yarns are dyed in either a soap or an acid bath, and then stoved.

The sulphured colours are chiefly in demand for Berlin and fancy wools, the favourite shades being cream, greenish yellow to gold, orange, maize, salmon, chamois, pink, Imperial red, lilac, azure, blue and yellowish green (parrot green).

### *Dyeing Pale Shades.*

Pale shades are always dyed in a soap bath, the following dyestuffs fast to stoving being used:

*For cream, light sulphur yellow, maize, salmon and chamois:*

Combinations of  
Thioflavine T  
Rosazeïne B  
Irisamine G;

*for light, greenish yellows and yellowish greens:*

Combinations of  
Thioflavine T  
Victoria Blue B;

*for light pink:*

Rosazeïne B  
Irisamine G  
Rose Bengale extra N (for very bluish shades);

*for lilac:*

Methyl Violet 3B—6B  
Crystal Violet 10B;

*for azure:*

Victoria Blue B;



for white:

Victoria Blue B	}	(for milky white)
Alizarine Cyanole B (for best fastness to light)		
Methyl Violet 3B—6B	}	for ivory white.
Crystal Violet 10B		
Alizarine Cyanole Violet R (for best fastness to light)		

Prepare a soap bath according to the hardness of the water with 3—8 oz curd soap or olive-oil soap per 10 gallons; add the colour solution, stir well, enter the yarn at 40—45° C (105—115 deg. F.), and work for  $\frac{1}{4}$  to  $\frac{1}{2}$  hour. Then lift the yarn, hydroextract evenly but not too severely, while repacking several times, stove overnight in the sulphur stove, and finally dry in the air in a shady place.

White is often stoved once more for a few hours.

### *Dyeing Full, Brilliant Shades.*

Basic and Eosine Colours, as well as Acid Colours, are used. The method of dyeing is the usual one in a bath feebly acidulated with acetic acid or, in the case of Acid Colours, with the addition of bisulphate of soda, or of Glauber's salt and sulphuric acid.

The following dyestuffs possessing very good fastness to stoving come into consideration:

*For shades ranging from sulphur yellow to orange:*

Combinations of		
Thioflavine T, TCN	}	Method XV, page 18
Rosazeïne B		
Irisamine G		
or with Acid Colours:		
China Yellow B	}	Method I, page 4;
Naphtol Yellow S		
Acid Yellow AT		
Rosazeïne B		

*for greenish yellow to yellowish green:*

Combinations of		
Thioflavine T, TCN	}	Method XV, page 18
New Methylene Blue N, NSS		
Victoria Blue B		

or with Acid Colours:

China Yellow B	} Method I, page 4
Naphtol Yellow S	
Acid Yellow AT	
Tetra Cyanole SF	

*for medium and dark pinks:*

In the first instance:

Rosazeïne B Method III, page 6;

for less bright shades:

Erythrosine, all brands	} Method IX, page 11
Phloxine, all brands	
Rose Bengale extra N	

*for exceedingly brilliant, light reds (Imperial Red):*

Rosazeïne B	} Method II, page 5
shaded with	
Orange extra, R	
Brilliant Scarlet GG, G	
Acid Yellow AT	

*for blue:*

Victoria Blue B Method XV, page 18

for greenish blues	{	Cyanole FF	} Method I, page 4
		Tetra Cyanole SF, extra	

After dyeing, rinsing and whizzing, the yarns are stoved overnight in the sulphur stove and then dried in the air in a shady place.

*Note:*

When dyeing in a soap bath, the use of soft water is an important point for the production of good results, and the use of condensed water is therefore recommended. Hard water must be softened before use.

The colour solution should be filtered through cotton cloth and added in measured off portions to the bath.

DYEING OF LOOSE WOOL, YARNS, COPS  
AND CHEESES IN DYEING MACHINES.

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## DYEING OF LOOSE WOOL, YARNS, COPS AND CHEESES IN DYEING MACHINES.

By dyeing wool and woollen or worsted yarns in machines, the material is preserved in the best possible condition, retaining its original softness and pliability, and there being no tear of felting.

These advantages can only be ensured, however, by following the method of working best adapted to the apparatus in use. Successful dyeing is dependent also on the type of apparatus employed, and less favourable results are likely to be obtained with apparatus than in the open vat if an unsuitable apparatus is used, or the wrong method of dyeing is followed.

It should be observed that not every kind of apparatus can be used with equal success for every kind of material, and there are in fact only very few apparatus which are constructed so as to be applicable at the same time for wool, and also for hanks, cheeses and cops. There are moreover only a few kinds of apparatus which are suitable for the dyeing of both wool and cotton.

Considerable economy in time, labour and steam can be effected by dyeing in machines, the amount of water used being likewise smaller than when dyeing in open vessels.

In selecting a machine, an important point to be considered is the material of which the machine is constructed. Iron machines are not to be recommended for wool dyeing, because iron destroys most dyestuffs in an acid liquor in consequence of reduction; such apparatus should therefore be entirely eliminated. Best are machines made of wood or copper, with bronze or copper fittings, or better still fittings of nickeline or nickel.

In machine-dyeing, the goods to be dyed usually remain unmoved, the liquor being forced through them by air suction or pressure, either by means of a pump or injector, or by some other means.

Dyeing machines constructed on the principle of dye-wheels are as a rule likewise classed among the dyeing apparatus. Such apparatus consist of a large vat similar to the kind used for piece-dyeing, provided with an axle placed horizontally in it, and at each end of which is fixed a wheel (or a star-shaped construction). Between the spokes of the two wheels, when dyeing hanks, sticks are placed in pairs, one near the axle and the other near the radius of the wheel, the yarn being stretched loosely between these two sticks. By the turning of the wheel the material is entered into the liquor, and worked in it. Loose wool in packed in perforated boxes which are constructed on the periphery of the wheels.

*Loose wool and yarn in hanks* are dyed exclusively by the *packing system*, either in a compact mass or divided into several layers, according to the system of the apparatus used. *Cheeses* and *cops* may likewise be dyed by the *packing systems*, but the dyeing on perforated *spindles* is also used very largely for the purpose.

*The apparatus are sometimes provided with two vessels, and sometimes only with one.* In the former case, either both vessels may be used for taking up the goods to be dyed, which renders it possible to increase the production, or only one of them is used as a dye vessel, the other being used as a reservoir for the liquor, which arrangement offers the advantage of rendering it easier to subsequently add acid and dye solution. It is also an advantage if the reservoir for the liquor can be also used for heating the liquor or if the steam-pipes in the dye-vessel can be dispensed with by providing a special vat for heating the liquor.

As a general rule, preference is to be given to *apparatus in which the course of the liquor is penetrating the goods by pressure and suction alternately.*

It is of great importance in machine-dyeing to have perfectly pure water. Water contaminated by mechanical impurities always has a deleterious effect, and must be purified before use by filtering. As a rule it is sufficient to fasten a sack of strong cloth (which is renewed from time to time) over the exit for the water. The use of hard water should likewise be avoided as far as possible, because many dyestuffs are affected by lime and magnesia, and are apt to cause uneven results, or dyeings which rub.

The Chromate Colours form an important exception in this respect, as they may be dyed to very good advantage in hard water according to the *Chromate Process*.

Regarding the softening of the water see appendix.

On a small scale the softening is done to best advantage in a special vat provided with a cock fitted 4—8 inches above the bottom. According to the hardness of the water, 5—10 oz of oxalate of ammonia are added for 100 gallons, and after the liquor has been well agitated, the precipitate is allowed to settle and the clear water free of lime drawn off by means of the cock.

It is not advisable to correct the water in the apparatus itself, as the precipitated lime settles on the goods and thus in the subsequent working causes inconvenience in the form of dust.

## DYEING OF LOOSE WOOL IN DYEING MACHINES.

For the *dyeing of loose wool*, *packing apparatus* come exclusively into consideration. Apparatus in which the wool is pressed together very tightly are however not to be recommended, as the softness and pliability of the fibre suffers by a prolonged, hot treatment of the tightly pressed material. Such apparatus are therefore to be given the preference in which the wool is kept fixed and prevented from floating only by means of loose covers or but lightly weighted covers.

Very well suited for this purpose are such apparatus in which the layer of material is not very thick or in which by disks of basket work or other means the material is divided into several thin layers.

The packing itself does not present any difficulty, as even layers may be easily obtained with the loose material.

*Machines with reversible circulation of the liquor* have likewise been found very suitable, as the wool is loosened by the reversing of the liquor, any risk of the formation of channels being thus obviated.

*Washing of very greasy wool* in the apparatus is not to be recommended, this operation being best carried out previous to entering the wool. On the other hand it is a great advantage to wet the wool previous to dyeing, if necessary with the addition of some ammonia.

In the latter case, the wetting-out liquor is allowed to run off, the dyeing being done in fresh water. Only when the wetted wool is found to be very dirty is it necessary to rinse it before the dyeing.

Special attention should be devoted to the selection of *suitable dyestuffs* for the purpose, good solubility and good levelling properties being the first consideration. Another point of importance is a complete dissolving of the dyestuff; for this purpose boiling condensed water should be used, the solution being added to the dye liquor through a hair sieve.

*As a general rule the same dyestuffs are used for loose wool dyeing in apparatus as are indicated for the dyeing of slubbing on pages 54—67. The Anthracene Chrome, Anthracene Acid and Anthracene Chromate Colours are used especially for the dyeing of loose wool, as these answer to best advantage the high requirements which are usually made regarding dyeings on wool and at the same time combine good solubility with good levelling properties.*

For the production of *mode shades, browns and olives* according to the *after-chroming* process, the following combination of dyestuffs has been found the best adapted in practice:

Anthracene Chrome Brown SWN  
 Anthracene Yellow BN  
 Anthracene Blue Black C or KG;  
 Anthracene Chrome Red A.

For the chromate process a combination of  
 Anthracene Chromate Brown EB, ER  
 Anthracene Yellow BN  
 Anthracene Chromate Grey KB  
 Anthracene Blue Black C

is the best suited for the same purposes.

For *Black*, the *Anthracene Chrome Black* brands of the "P" and "PP" series are best suited for machine-dyeing; particularly

Anthracene Chrome Black PPN extra  
 PPC extra  
 PPT extra  
 PF extra  
 PFB extra  
 PBB

are used, depending on the shade desired.



*The method of dyeing is as a rule the same as customary when dyeing in open vessels, but must always be adapted to the machines in use.*

It is of great importance to pay special attention to the temperature during the dyeing process. Whereas, when dyeing in open vessels, the desire is as far as possible to reach boiling temperature, it is more correct, when dyeing in machines, not to exceed a temperature of 92—94° C. (197—201° F.). This temperature suffices also for the fixing of the Chrome Colours. When the temperature of 94° C. (201° F.) is exceeded, some pumps are very apt to set out, and, apart from the wool being affected, there is a risk of the bottom layers being dyed a darker shade than the rest.

Particular attention must also be devoted to the *addition of acid*; this is done to best advantage by means of a dropping vessel, after shutting off steam. If machines with reversible circulation are in use, it is best to add the acid when the liquor flows from the bottom to the top, such method also causing the loosening of the wool layer.

Not very dark shades are dyed to best advantage according to the *after-chroming process*, by charging the bath at the commencement of the dyeing operation with the requisite quantity of dyestuff and the *whole of the quantity of acid necessary for the dyeing*, then commencing to dye at abt. 30° C. (85° F.) and raising somewhat more slowly (in the course of abt. 1 hour) to the boil, and boiling for 1 hour. The quantity of acid used is somewhat smaller than when dyeing in open kettles on account of the smaller volume of the liquor. The *after-chroming* is as a rule carried out in the dyebath, but before adding the bi-chrome the liquor should always be cooled off to 70—75° C. (160—170° F.). The chroming may to advantage also be carried out in a fresh liquor, in which case it is well to add some acetic acid to the chrome bath.

For the *Chromate Process* the general method (Method XII) given on page 14 should be applied.

If *subsequent shading* is to be resorted to, the bath must previously be cooled down well; it is however preferable to shade in a fresh bath.

After completing the dyeing, it is advisable to cool the wool off gradually in the machine because the wool is rendered more harsh by cooling it off suddenly with cold water.

Examples from Practice.

We give the following examples of dyeing in practice in order to elucidate the above remarks indicating at the same time the best methods of working to be adopted.

1. Drab on Loose Wool, dyed according to the After-Chroming Process.

150 lbs fine Australian Wool, approx. 160 gallons.

Anthracene Chrome Brown SWN 1 lb  $3\frac{1}{4}$  oz

Anthracene Blue Black KG  $7\frac{5}{8}$  oz

Anthracene Yellow BN  $1\frac{1}{4}$  oz

Acetic acid 8° Tw. 9 lbs.

The well scoured wool is packed in a dry state into the apparatus, and the temperature of the water raised to about 50° C. (120° F.). After wetting the wool, the stated quantity of acetic acid is added, then the well dissolved dyestuff through a fine hair-sieve. Treat for about 5 to 10 minutes at 50° C. (120° F.), and turn on the steam, so that the liquor comes to the boil in about 35 to 40 minutes, i. e. reaches the temperature of 94° C. (201° F.). Work at this temperature for about 1 hour, then cool off to 70° C. (160° F.), and allow the dilute solution of

1 lb bichrome

to flow gradually into the bath. Then raise the temperature again to 94° (201° F.), and treat for another  $\frac{1}{2}$  hour at this temperature.

2. Brown on Loose Wool, dyed according to the Chromate Process.

100 lbs German Wool, approx. 150 gallons.

Anthracene Chromate Brown EB 2 lbs

Anthracene Yellow BN  $1\frac{1}{2}$  lbs

The scoured wool, in a wet state, is put evenly into the apparatus and the temperature of the water raised to 70° C. (160° F.). The well dissolved dyestuff is then added through a fine hair-sieve, and the bath heated to 94° C. (201° F.) in the course of about 20 minutes. Treat the goods at this temperature for about  $\frac{1}{2}$  hour, then shut off steam, allow the solution of the requisite

1 lb  $1\frac{1}{4}$  oz bichrome

to flow in in a fine jet from a vat placed at a higher level, then heat again to 94° C. (201° F.), and treat for another  $\frac{3}{4}$  hour.

In order to complete the exhaustion of the bath, which is already nearly exhausted, add

1½ lbs acetic acid

in a well diluted state in the same manner as with the bichrome, and after treating for another ¼ hour, complete the dyeing by cooling off the goods in the apparatus and rinsing simultaneously.

### 3. Black on Loose Wool, dyed according to the After-Chroming Process.

240 lbs Coarse Cape Wool, approx. 300 gallons.

Anthracene Chrome Black PPC extra 16¾ lbs

Acetic acid 8° Tw. 7¼ lbs.

Pack the dry wool evenly into the apparatus, and wet it with water heated to 70° C. (160° F.); hereafter add the well dissolved dyestuff through a hair-sieve to the bath, as also the diluted acetic acid. After a short time raise the temperature to the boil 94° C. (201° F.), and continue for ½ hour at this temperature. Hereafter exhaust the bath by allowing the well diluted

3½ lbs sulphuric acid

to flow in gradually, and when the liquor is clear, replace it to about one-half with fresh water, and then chrome.

Dissolve

• 6 lbs bichrome,

and allow the well diluted solution to flow in gradually; hereafter raise the temperature again to boiling point (94° C. = 201° F.), and treat for 35 to 40 minutes at this temperature. Finally cool off the wool in the machine, and rinse.

## THE DYEING OF WOOLLEN AND WORSTED YARNS IN DYEING MACHINES.

*Woollen and worsted yarns in form of hanks* are most generally dyed according to the *packing system*, in the same way as loose wool.

Those kinds of apparatus should also be given the preference which do not necessitate a severe pressing of the goods, because continued boiling has an unfavourable effect also on firmly pressed yarns, as is shown by crimps

and flaws in the yarns, which it is practically impossible to remove. In the same way as for loose wool it is an advantage if the layers are not too thick, the yarn being divided into several thin layers by interposed disks of basket work.

The reversing of the circulation of the liquor is of great importance for obtaining level shades, and is to be recommended for yarns, which have to satisfy very high requirements in point of levelness.

Great care must be taken to *place the yarns or hanks evenly into the machine*, in order to avoid the formation of channels during the dyeing. The hanks should not all lie in the same direction one on top of the other, but the different layers should be placed crossways. In these machines the hanks lie horizontally and the liquor is forced through them vertically.

Of late it has been much the custom to dye hanks also in special machines, the hank yarn being previously hung on sticks or cords and *packed in blocks* which are placed in the machine. The yarn hangs in the blocks, and the liquor circulates in the same direction as the threads, by which means crimps and flaws are prevented, the hanks retaining their smooth and natural appearance without felting. These machines prove particularly well adapted for smooth yarns (worsted yarns).

The hanks are packed or placed in the machines *without being wetted out previously*. Particularly in the case of the packing apparatus is it found an advantage not to scald the yarns before packing them.

Yarns which are not very clean *are wetted to best advantage in this apparatus* with the addition of some ammonia; if necessary they are rinsed and then dyed in fresh water. Wetting is always useful, because it removes the air bubbles remaining in the material.

Besides these various kinds of machines, there are the dyeing machines *built according to the principle of dye-wheels*. These are used principally in Great Britain, the United States of America, Canada, and Australia, and permit of dyeing very large lots, the packing apparatus on the other hand being usually given the preference when the customers make a special point of very level shades and the best possible condition of the material.

Finally the *automatic hank-dyeing machines* should be mentioned in which the hanks are suspended in the same way as in open vats, the turning being done by the action of the machine.

Special attention should be paid to the *selection of the dyestuffs*, care being taken also that only such dyestuffs are used as are readily soluble and level well. Good results being dependent mainly also on good dissolving of the dyestuff; the dissolving should always be done in hot condensed water, the solution being added to the dyebath through a fine hair-sieve or a piece of cotton cloth.

*In addition to the Acid Colours, Diamine Colours come into consideration for the dyeing of yarns in machines, and particularly also the Anthracene Chrome and Anthracene Chromate Colours. The Anthracene Chrome Colours are dyed as a rule according to the after-chroming process; dyeing of previously chromed yarns in machines is only resorted to for the production of special shades (for bright blues).*

For *mode shades, browns and olives, Chrome Colours* in particular are used, combinations of

Anthracene Chrome Brown SWN	} dyed according to the after-chroming process
Anthracene Yellow BN	
Anthracene Blue Black C and KG	
Anthracene Chrome Red A	

being found the best suited in practice for such purpose. The *leather-brown shade* on knitting yarns which frequently causes trouble is likewise obtained perfectly level by means of this combination of dyestuffs.

Of *Chromate Colours*, a combination of

Anthracene Chromate Brown EB and EB  
Anthracene Yellow BN  
Anthracene Chromate Grey KB  
Anthracene Chromate Green B

is the best suited for *mode shades* etc.

For *Blacks on Fancy Yarns*,

Naphtylamine Black S  
ESN  
ES3B  
Naphtylamine Blue Black B  
5B

are mostly used, whereas for *Blacks for knitting and hosiery yarn fast to washing*,

Naphtylamine Black 4B  
6B  
BBN

in particular, as also

Alphanol Black 3BN  
BG  
KV  
KWAN conc.

with their still better fastness to washing, are used very largely.

For *black yarns* which are required to answer rather exacting demands in point of *fastness to washing, milling and potting* as also *fastness to light*, the *Anthracene Chrome Black* brands come into consideration, of which

Anthracene Chrome Black PPN extra  
PPS extra  
P extra  
PFB extra  
PPT extra  
PBB  
KV

in particular have been adopted largely for machine-dyeing.

In *dyeing*, care has to be taken that if possible no acid is added subsequently except in the case of Blacks or of deep shades, because if the addition is not carefully done, unlevel effects are very apt to result even when using the very best dyestuffs.

When *dyeing with Acid Colours*, *Alphanol Black* or *after-chroming dyestuffs*, the baths should therefore be charged with the whole of the acid (acetic acid, sulphuric acid or formic acid) required for the dyeing, before commencing to dye. The dyeing should be started at about 30° C. (85° F.) and the temperature only gradually raised to the boil (as a rule in the course of 1 hour), the boiling being continued for 1 to 1½ hours, according to requirement. The dyeing of *Chrome Colours* is frequently started with acetic acid and acetate of ammonia, by which means a very gradual action of the acid is attained, the very greatest care being hereby exercised for producing level results.

*After-chroming dyestuffs* are to best advantage after-chromed in a fresh bath with the addition of acetic acid, because by after-chroming in an incompletely exhausted liquor, dyeings of unsatisfactory fastness to rubbing or insufficient levelness are apt to result. The same may be the case if the chroming is done in a dyebath which has not been sufficiently cooled off previously. The material too should be cooled before the chroming by pumping fresh liquor or the cooled off dye-liquor through previous to adding the requisite bichrome and also 1—2% acetic acid if this last addition be necessary.

A different method of dyeing is applied for *the black Chrome Colours* the dyeing of which is commenced with acetic acid, these being dyed with the gradual addition of acid (see Method X, page 12). It is also very advantageous for such blacks to do the *after-chroming* in a fresh bath.

*Chromate Colours* as a rule are dyed according to Method XII, page 14. For medium and deep shades however it is well to charge the bath in the first place with the dyestuff alone, the requisite bichrome being added gradually by means of a dropping vessel only after about  $\frac{1}{2}$  hour's boiling.

*Diamine Colours* are dyed in apparatus either with the addition of 10% Glauber's salt only or of 10% Glauber's salt and 5% acetate of ammonia, no acid whatever being added.

If any dyestuff is to be added subsequently, this may be done without any difficulty after first cooling the bath off a little *when dyeing with Acid Colours or when shading with Acid Colours*; *Diamine Colours* may be added in the same way. In the case of *Chrome Colours*, on the other hand, a fresh liquor is to advantage used for the *subsequent shading*, unevenness being very apt to result by shading in the chroming bath.

In order to obtain satisfactory results in machine-dyeing, it is of great importance to make *careful observation of the temperature, particularly of the boiling temperature*. The temperature should not exceed 92—94° C. (197—201° F.) this being quite sufficient for the fixing of the dyestuff. When the temperature of 94° C. (201° F.) is exceeded, some pumps are very apt to set out, and, apart from the wool being affected, there is a risk of the bottom layers being dyed a deeper shade than the rest.



After completing the dyeing, care has to be taken that the hanks are not cooled off suddenly; the cooling should be done gradually, as the quality of the wool is affected by a rapid change in the temperature.

Examples from Practice.

In illustration of the above details regarding the dyeing of yarn in dyeing machines, we give in the following some examples from practice with the method of working pursued.

1. Grey on Worsted Yarn, dyed according to the Chromate Process.

76 lbs 40/2 Worsted Yarn, approx. 80 gallons.

Anthracene Chromate Grey KB 9½ oz

Anthracene Chromate Brown EB 2½ oz

Bichrome 6½ oz

After the hanks have been laid evenly, in layers, in the apparatus, wet them with the water heated to 60° C. (140° F.), and hereafter add the well dissolved dyestuff. Bichrome should not be added together with the dyestuff, but should be dissolved separately and added after the dyestuff to the bath. Then run for about ten minutes without steam, raise the temperature to the boil (about 94° C. or 201° F.), and maintain this temperature for about 1 to 1¼ hours. The bath becomes sufficiently well exhausted. Cool the batch off in the apparatus, or rinse lightly.

2. Leather Brown on Knitting Yarn, dyed according to the After-Chroming Process.

170 lbs 16/4 Knitting Yarn, approx. 130 gallons.

Anthracene Chrome Brown SWN 2 lbs 6½ oz

Anthracene Yellow BN 1 lbs 14 oz

Anthracene Chrome Red A 4 oz

Glauber's salt 17 lbs

Acetic acid 8½ lbs

Place the yarn evenly in the apparatus, and wet with the addition of ½ % ammonia at a temperature of 40—45° C. (105—115° F.) Then add the stated quantity of Glauber's salt, as well as the dyestuff well dissolved (the latter through a fine hair sieve) and the acetic acid, run for about 10 minutes without steam, and raise the temperature to boiling point (about 94° C. or 201° F.) in the



course of about  $\frac{3}{4}$  hour. Maintain this temperature for about one hour, during which time the bath becomes completely exhausted. Hereafter run the liquor off, fill the apparatus with fresh water, allow same to circulate several times through the yarn in order to cool it off, then add the solution of

2 lbs 5 oz bichrome and  
1½ lbs acetic acid

raise the temperature again to the boil, and maintain this temperature for another  $\frac{1}{2}$  to  $\frac{3}{4}$  hour. Hereafter cool the goods off in the apparatus, and rinse lightly.

### 3. Black on Hosiery Yarn, dyed direct in an Acid Bath.

300 lbs 8/3 Hosiery Yarn, approx. 180 gallons.

Alphanol Black 3BN	21 lbs
Glauber's salt	24 lbs
Acetic acid	15 lbs

The yarn, evenly packed in the apparatus, is first wetted with the liquor at about 60° C. (140° F.) Hereafter add the dyestuff, well dissolved, through a hair sieve, as well as the Glauber's salt solution and diluted acetic acid. Raise in 20 to 30 minutes to the boil (about 94° C. or 201° F.), and exhaust the bath after  $\frac{1}{2}$  hour's boiling by adding

9 lbs bisulphate of soda

The bisulphate is dissolved well and added gradually to the liquor which has been previously cooled off a little, or the bisulphate is allowed to flow in slowly from a barrel placed at a higher level. When the liquor is sufficiently exhausted, cool the yarn off, and rinse it in the apparatus.

### 4. Black on Cheviot Yarn dyed according to the After-Chroming Process.

210 lbs 32/2 Weft Yarn, approximately 140 gallons liquor.

Anthracene Chrome Black PPN extra	15¾ lbs
Acetic acid	6¼ lbs

The regularly packed yarn is wetted with water of 70° C. (160° F.), then the thoroughly dissolved dyestuff is added to the bath by passing the solution through a hair sieve, the acetic acid also being added. After a short while, the temperature is raised to the boil within 20 to 25 minutes, after boiling for another 30 minutes, steam is shut off, and in order to exhaust the bath,

5½ lbs sulphuric acid

well diluted are allowed to flow in. Hereafter the steam is turned on again, and the goods are worked at boiling temperature until the bath has turned clear (the liquor being slightly reddish). Then the liquor is let off, the apparatus is charged with fresh water, and

5 lbs 6½ oz bichrome

2 lbs                      acetic acid

well dissolved, are added; hereafter the temperature is raised to the boil and the boiling continued for ¾ hour. Finally the yarn is cooled off in the customary manner in the apparatus, and slightly rinsed.

### THE DYEING OF WOOLLEN AND WORSTED YARN IN THE FORM OF COPS OR CHEESES.

*Woollen and worsted yarns in the form of cops and cheeses* can only be dyed in apparatus, according either to the *packing or the spindle system*, the latter yielding on the whole the best results. Nevertheless dyeing according to the packing system has also been introduced to a great extent, as a much higher production may be attained hereby than by the first-named system. The packing system serves in the first place for *cheeses*. *Cops*, which although wound tighter, are more apt to break, and accordingly demand a more careful handling, are principally dyed according to the spindle system.

The same apparatus which are used for dyeing *packed* hank-yarn (page 85) may also be applied to good advantage for the above-named purpose. It is necessary to fill the paper tubes which run right through the cops or cheeses with small sticks of wood or vulcanite in order to prevent the spools from being crushed and thus to render them firmer. *Cheeses* may be packed either standing or lying, the first method of packing being applied for apparatus fitted with round vessels. It is advantageous to pack the cheeses so that the liquor must pass the textile winding in a horizontal direction to the longitudinal shaft, as hereby a much more efficient packing may be obtained, and on the other hand a much more regular resistance is offered to the circulating liquor. Special attention must be given to regular, firm packing of the cheeses and to careful filling up of all interstices, if necessary also of closing the ends of the tubes; these points have to be more carefully attended to than the packing of

hank yarns. Between the layers of upright packed cheeses, filling material (mostly loose cotton) is placed with a view to keeping the single layers well apart from one another, and in order to render the filling of the intermediate spaces more effective, a thorough pressing down of the whole packed mass is necessary. The cheeses are hereby more or less impaired in their shape but this fault may be remedied by a suitable treatment before drying. Finer counts for this reason are frequently dyed according to the spindle system. In case of the cheeses being wound rather tight, thorough penetration is not always attained by the packing system, and for this reason the dyeing on spindles is also to be given the preference for tightly wound bobbins. .

*Cheeses* which are to be dyed according to the spindle system must be spooled on perforated tubes, for which purpose perforated impregnated paper tubes have been recently introduced to very good advantage. This impregnated paper tube not only lasts longer than an ordinary tube, but also gives the spool altogether a better stability of form, and allows of a better closing of the upper end of the tube. The cheeses are placed on perforated spindles made of nickeline or nickel (other metals should be avoided as far as possible), and are tightened off in a suitable manner.

Frequently two or more cheeses are placed on one tube if by this means an economy in space, and thus a higher production, may be effected.

For cheeses, spindles are available which are fitted with top and bottom liquor chambers. Other systems show such intermediate chambers between the various spools, by which means more certain and more regular results are obtained.

For the purpose of dyeing according to the spindle system, *cops* are spun on to perforated paper tubes which do not pass through the whole length of the cops, and are placed on to correspondingly perforated metal spindles. In case the cops should have been spun on fairly wide paper tubes which pass entirely through, the paper tubes must be exchanged before dyeing in spindle apparatus by placing the cops on corresponding metal tubes. Such a replacing can however only be carried out with dry cops, for which reason they should be dried gently before changing the tubes. The metal spindles on which the

cops have been placed are fixed on to the holder, and are then inserted in the apparatus. In order to prevent the cops from sliding off the spindles, they are frequently fixed by running a piece of wire through the top end of the spindle.

The hollow spindles which are used in the spindle system must always be kept very clean, and special care has to be taken to prevent the openings from becoming choked up.

Most of the apparatus intended for dyeing cops or cheeses are fitted with pumps which allow of a reversible circulation of the liquor, so that according to the spindle process the liquor may penetrate either from the outside to the interior of the cops or cheeses or inversely. At the commencement of the dyeing the pump is adjusted in such a manner that the liquor passes through the material from the inside to the outside; this direction of the circulation must always be maintained if dyestuff or acid are to be added to the bath.

Mention should also be made of those spindle apparatus which allow the circulation of the liquor in but one direction, i. e. from the outside to the interior, in which however the penetration of the goods is very well attained by means of a *high column of liquor* above the material holders; by the pressure of the column the penetration of the liquor is brought about without any other aid.

For good results in *dyeing cheeses or cops*, a selection of the most suitable dyestuffs is of great importance, all the more as in the case of tightly wound cops or cheeses good level dyeings and good penetration of the material requires particular care. The dissolving of the dyestuffs is another very important point, and while special regard has to be taken in this respect in dyeing in apparatus generally, this point is of more especial importance in the case of dyeing cheeses or cops. The dissolving should always be carried out with boiling condensed water and the solutions must always be passed through a fine sieve or through a linen cloth into the bath.

*Generally speaking, the same dyestuffs as recommended for the dyeing of hank yarns in apparatus also come into consideration for dyeing yarn in the form of cheeses or cops; the Acid and Diamine Colours along with the Chrome Colours possess however considerable importance for this method of dyeing, because those yarns also are*

dyed in apparatus for which special demands are made for brightness, as well as those for which the requirements for fastness are less exacting.

For *mode shades*, combinations of the following *Acid Colours* come into consideration possessing *best fastness to light*:

Alizarine Cyanole EF  
Brilliant Lanafuchsine GG  
Fast Acid Yellow TL  
Cyanole Fast Green G,

while of *Acid Colours fast to milling*, combinations of  
Tetra Cyanole A  
Wool Red B  
Milling Yellow O

are best suited.

Of the *Diamine Colours*, combinations of

Diamine Brown B or M  
Diamine Catechine G  
Diamine Fast Yellow FF  
Diamine Black DN

are best suited if *mode shades* are to be produced.

*Chrome Colours* are mostly dyed according to the *after-chroming process* or according to the *chromate process*, while dyeing on a *chrome mordant* is only resorted to for some special shades (bright blues).

For *mode shades*, *browns* and *olives* combinations of the following *Chrome Colours* dyed according to the *after-chroming process* are quite generally used in practice:

Anthracene Chrome Brown SWN  
Anthracene Yellow BN  
Anthracene Blue Black C and KG  
Anthracene Chrome Red A,

these having proved the best adopted for the purpose.

Of the *Chromate Colours*, a combination of

Anthracene Chromate Brown EB and ER  
Anthracene Yellow BN  
Anthracene Chromate Grey KB  
Anthracene Chromate Green B

is the most suitable for producing *mode shades* etc.

For *Blacks*:

Naphtylamine Black S

ESN

ES3B

Naphtylamine Blue Black B

5B

are used if no special demands for fastness to washing are made of the goods for which the yarn is applied, while for *Blacks fast to washing*,

Naphtylamine Black 4B

6B

BBN,

and for blacks of still better fastness to washing,

Alphanol Black 3BN

BG

KV

KWAN conc.

are very extensively used.

For *black yarns for which high demands are made with regard to fastness to washing, milling, potting and light*,

Anthracene Chrome Black PPN extra

PPS extra

PPT extra

P extra

PFB extra

PBB

KV

come into consideration, these having in practice proved specially satisfactory for such purpose.

In *producing the dyeings*, care has to be taken — with the exception of blacks and dark colours — that *as far as possible no acid is added subsequently*, because in light and medium shades, the level dyeing is impaired if the additions of acid are not made most carefully, even if the very best levelling dyestuffs are used.

When dyeing with *Acid Colours* or *After-Chroming Colours*, the baths are prepared before the commencement of the dyeing *with the whole quantity of acid required* (acetic, sulphuric or formic acid); the dyeing is commenced at about 30° C. (85° F.), the temperature being

brought quite slowly — as a rule in the course of an hour — to the boil. According to requirement, i. e. depending on the depth of shade required, boiling temperature is maintained for  $\frac{3}{4}$  to 1 hour. Dyestuffs which are easily absorbed by the fibre, particularly Chrome Colours, are frequently dyed with the addition of a combination of acetic acid and acetate of ammonia for light and medium shades; by this means, the acid acts very gradually, affording the very best conditions for the production of good, level shades.

*Acid Chrome Colours* are *after-chromed* after  $\frac{3}{4}$  to 1 hour's boiling, to best advantage in a fresh bath, because it is not always possible to effect complete exhaustion of the baths and there is always the risk of uneven dyeings or dyeings which rub off being produced when chroming in a bath which is not fully exhausted. In any case care has to be taken that the chroming bath is not more than about 65° C. (150° F.) at the start. The material should moreover be cooled off correspondingly by pumping the fresh liquor or the cooled off bath through it several times before adding the bichrome. An addition to the chrome bath of about 1—2% acetic acid is much to be recommended if the chroming is to take place in a fresh liquor.

*Black Chrome Colours* the dyeing of which is started with acetic acid are usually dyed according to a different method than the above; the same is the case with such dark shades for the dyeing of which it is not practicable to add the whole of the requisite amount of acid at the beginning of the dyeing operation. These are dyed with the gradual addition of acid in accordance with Method X on page 12, in the same way as when dyeing yarn in open vessels. *After-chroming in a fresh bath* is however very favourable also in the dyeing of Blacks, and may be applied to good advantage too for other dark shades.

*Chromate Colours*, particularly in the case of full shades, are dyed to very good advantage by first boiling the dyestuffs in a neutral bath and allowing the requisite amount of bichrome to flow in gradually from a dropping vessel after about  $\frac{1}{2}$  hour's boiling (see Method XII, page 14).

*Diamine Colours* are dyed with the addition of 10% Glauber's salt only or of 10% Glauber's salt and 5% acetate of ammonia. Commence dyeing at about 40° C. (105° F.),



raise gradually to the boil, and dye gently boiling for  $\frac{3}{4}$  to 1 hour. It is not advisable to add any acid subsequently; if in one case or another it is necessary to aftertreat with metallic salts (bichrome, sulphate of copper), this is done to best advantage in a fresh bath with the addition of 2—3% acetic acid.

When dyeing with Acid or Diamine Colours, the *subsequent shading* may without hesitation be done with these dyestuffs in the cooled off bath, and the same method may be pursued when shading chromed dyeings with Acid Colours. If however dyeings which are already chromed are to be shaded with Chrome Colours, it is better in all cases to work in a fresh bath.

An essential point to be observed, in order to obtain satisfactory results in the dyeing of cops and cheeses is the maintenance of the *proper temperature of the dyebath*. A temperature of 92—94° C. (197—201° F.) is to be considered as boiling temperature. Any temperature higher than this is not to be recommended, as it has a detrimental effect on the quality of the wool, the temperature indicated being moreover quite high enough for fixing the Chrome Colours and others. At a higher temperature there is the risk also of obtaining uneven shades because certain kinds of pumps cease to work effectively at a temperature exceeding 94° C. (201° F.).

As a sudden change in the temperature is apt to render the yarns harsh, the cooling off after dyeing should be effected gradually.

#### Examples from Practice.

In supplementing the above explanations we give in the following a few examples from practice.

#### 1. Bright Orange on Cops, dyed on Spindles in an Acid Bath.

30 lbs 52/1 Worsted Yarn, approx. 50 gallons liquor.

After wetting the cops in the apparatus in a bath at a temperature of 50° C. (120° F.) with the addition of 2% ammonia, run off the liquor, charge the machine with fresh water, and add the requisite amount of dyestuff and acetic acid (the former through a fine hair sieve), viz:

Milling Yellow O	12	oz
Wool Red B	2	oz
Acetic acid	1½	lbs.



Commence dyeing at about 30° C. (85° F.), raise to the boil in the course of one hour, and maintain this temperature (92—94° C. or 197—201° F.) for  $\frac{3}{4}$  to 1 hour. When the bath has been thoroughly exhausted, the cops are cooled off in the apparatus.

## 2. Mode Shades on Cheeses, dyed neutral in the Packing Apparatus.

124 lbs 16/1 Worsted Yarn, approx.	100 gallons liquor.
Diamine Catechine G	1 $\frac{1}{4}$ lbs
Diamine Fast Yellow FF	3 oz
Diamine Black DN	4 oz
Glauber's salt	12 lbs
Acetate of ammonia	6 lbs.

The cheeses, well packed, are first wetted with the water at about 45° C. (113° F.). Add the stated quantity of Glauber's salt and neutral acetate of ammonia as well as the solution of the dyestuff (the latter through a hair sieve). After 10 minutes, turn on steam, and heat the bath to boiling temperature within 30 to 40 minutes. Work for  $\frac{3}{4}$  to 1 hour at this temperature, and cool off the cheeses in the apparatus.

## 3. Olive Brown on Cops, dyed on Spindles by the After-Chroming Process.

96 lbs 42/1 Worsted Yarn, approx.	100 gallons.
Anthracene Chrome Brown SWN	1 lb 14 $\frac{3}{4}$ oz
Anthracene Yellow BN	9 $\frac{1}{8}$ oz
Anthracene Blue Black C	15 $\frac{3}{8}$ oz
Acetic acid	4 lbs
Acetate of ammonia	3 lbs.

The cops are wetted as indicated for Example 1. Add the solution of the dyestuff through a hair sieve, then the acetic acid and acetate of ammonia, and commence dyeing at about 35° C. (95° F.). Turn on steam after a few minutes, bring to the boil (92—94° C or 197—201° F.) in the course of an hour, and maintain this temperature for 1 to 1  $\frac{1}{4}$  hours. Then run off the liquor, and chrome in a fresh liquor charged with

Bichrome	1 lb 14 oz
Acetic acid	15 oz

Raise to boiling temperature in the course of 25 to 30 minutes, and chrome at this temperature for 35 to 40 minutes. Then rinse the cops in the apparatus.

4. Beige on Cheeses, dyed on Spindles by the  
Chromate Process.

50 lbs 64/1 Worsted Yarn, approx. 50 gallons liquor.

Anthracene Chromate Brown EB	$\frac{4}{5}$ oz
Anthracene Yellow BN	$\frac{4}{5}$ oz
Bichrome	$1\frac{1}{4}$ oz

The cheeses are wetted in the machine with the addition of  $\frac{1}{2}\%$  ammonia, the bath being then renewed and heated to 60° C. (140° F.). Hereafter add the solution of the dyestuff and the bichrome dissolved separately, work for 10 minutes without steam, and then bring gradually — in the course of 30 to 40 minutes — to the boil (approx. 94° C. or 201° F.). It is very important that the dyestuff and bichrome are not dissolved together and that the latter should be added separately to the bath. Then dye at boiling temperature for about  $\frac{3}{4}$  to 1 hour, the bath being thereby exhausted sufficiently. After completing the dyeing, rinse the cheeses in the apparatus.

5. Black on Cheeses, dyed on Spindles in an Acid Bath.

170 lbs 32/1 Weft Yarn, approx. 120 gallons liquor.

Naphtylamine Black ESN	10 $\frac{1}{2}$ lbs
Glauber's salt	17 lbs
Sulphuric acid	7 lbs

Wet the cheeses in the machine at about 45° C. (113° F.), then add the Glauber's salt and acid as well as the dyestuff (the latter through a hair sieve). After working for about 10 minutes with steam shut off, raise to boiling temperature (approx. 94° C. or 201° F.) in the course of  $\frac{3}{4}$  hour, and maintain this temperature for one hour. When the bath is exhausted thoroughly, cool off, and rinse (if necessary) in the machine.

6. Black on Cops, dyed on Spindles by the  
After-Chroming Process.

144 lbs 9's Woollen Yarn, approx. 100 gallons liquor.

Anthracene Chrome Black KV	12 lbs
Acetic acid	4 $\frac{1}{2}$ lbs

The cops are first wetted with the water at 70° C. (160° F.), the solution of the dyestuff being then added through a

hair sieve to the bath and then the acetic acid. Run for about 10 minutes, heat within 25 minutes to boiling temperature ( $92-94^{\circ}$  C. or  $197-201^{\circ}$  F.), after further 30 minutes shut off steam, and exhaust the bath by allowing a well diluted solution of

Sulphuric acid 4 lbs

to flow in gradually. After adding the acid, heat again to boiling temperature, and dye until the bath is clear or at all events has only a very slightly reddish tinge. Hereafter chrome in a fresh liquor with

Bichrome 4 lbs

Acetic acid 3 lbs;

then heat again to  $92-94^{\circ}$  C. ( $197-201^{\circ}$  F.), run for 35 to 40 minutes at this temperature, and rinse in the machine.

Very tightly wound cops for which it does not appear advisable to subsequently add any acid, not even for black dyeings, are frequently dyed in the following manner: The bath is charged at the commencement of the dyeing operation with the quantities indicated both of acetic and sulphuric acid, adding however at the same time  $1\frac{1}{2}$  lbs ammonia per 100 lbs goods and commencing to dye at about  $50^{\circ}$  C. ( $120^{\circ}$  F.). The addition of ammonia neutralises the sulphuric acid, but as the ammonia gradually escapes on heating to the boil, the sulphuric acid is liberated gradually, and a slow but reliable action of the acid is thus obtained. With this method of working the duration of the treatment at boiling temperature is about  $1\frac{1}{4}$  to  $1\frac{1}{2}$  hours. The method of working in other respects, chroming, etc. is the same as indicated above.



DYEING OF WOOLLEN AND WORSTED  
PIECE-GOODS.

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## DYEING OF WOOLLEN AND WORSTED PIECE-GOODS.

*Scouring of Wool Fabrics.* Before dyeing, the goods should be very carefully wetted out in hot water. Goods which are not quite clean are wetted with the addition of 1—2% ammonia of the weight of the material, which removes part of the residue of soap and also some faults possibly caused in the preliminary treatment, the goods being then rinsed in fresh water. Goods which have a tendency to produce skittery effects or to yield uneven two-coloured shades owing to different qualities of wool being used for the manufacture of the piece, are to advantage boiled in water for 1 to 1½ hours previous to dyeing.

*Carbonising of Wool Pieces.* Piece-goods are in most cases carbonised just before the dyeing, sometimes also previous to the milling. The carbonising is as a rule done similarly as described on page 21 for loose wool, with sulphuric acid of 6—9 deg. Tw.; in the case of colours which are sensitive to acids, and sometimes even for pale, delicate shades, aluminium chloride solutions of 9—12 deg. Tw. or less frequently magnesium chloride solutions of 15 deg. Tw. are used.

The goods are impregnated with the acid etc. in a wooden vat provided with a slowly running winch, for 1 to 2 hours, according to the thickness of the material, or for a shorter time in the washing machine; they are then evenly whizzed in a Hydroextractor which has been well lead-lined or provided with an acid-proof coating, and hereafter carbonised without unnecessary delay. In case it should be impossible to carbonise the pieces at once, it is well to cuttle them and cover them with a cloth soaked in the carbonising liquor in order to protect them from the effect of direct sunlight, drops of water, draught etc. because any portions altered in this way dye a less deep or even a different shade than the rest of the material. As particularly the folds or lists in cuttled goods have a tendency to dry up, such faults in carbonising as a rule show up in the form of streaks running crossways or lengthways in the material.

The pieces are usually carbonised in stoves specially built of brick-work, through which the goods are run horizontally over a number of wooden guiding rollers. These stoves are heated either by heating apparatus fixed at the bottom of the interior, or with hot air. They con-

tain two chambers; in the first one, which should be provided with an outlet for the moist air and acid vapours, the pieces are dried at moderate heat, and in the second they are carbonised at 90—110° C. (195—230° F.) or considerably hotter if magnesium chloride be used. Care should be taken that no condensation of water takes place during the drying and carbonising, because drops of water falling on to the goods impoverish them considerably, and are apt to cause spots on dyeing. Should a special carbonising stove not be available, the goods are sometimes simply hung up in drying rooms which are well ventilated during the drying process, and are heated strongly, with the ventilating valve closed, for the carbonising proper; another method is to pass the goods several times over drying cylinders which are tinned, or, better still, covered with woollen cloth; it is difficult however to make such drying cylinders hot enough to work satisfactory.

If *goods containing cotton selvages* are to be carbonised, such selvages, before entering the carbonising stove, are given a coating of silicate of soda of 15° Tw. or of a soda solution thickened with chalk.

After the carbonising, the goods are run for a little while in a dry washing or milling machine in order to remove the charred burrs and cotton particles.

The next process is to *neutralise the carbonised goods*. After a short rinsing in water they are usually neutralised with soda or ammonia, and then well rinsed in water. Pieces which are to be dyed with easily levelling colours or which have been dyed previously, are frequently simply well rinsed in water in the washing machine. In order to remove the fatty handle of goods carbonised with aluminium chloride or magnesium chloride they are first of all washed with a little sulphuric or hydrochloric acid, and then thoroughly washed with fuller's earth with the addition of some soda.

*Bleaching of Wool Pieces.* The goods are bleached in the same manner as described on page 50 for yarn, special care being paid to keeping the pieces well immersed in the liquor.

*Dyeing of Wool Pieces.* The goods are generally dyed on a winch driven by machinery, and almost exclusively in the rope form. In case the selvages roll up, the goods are sewn together in such a manner as to form a sort of hose, which prevents the fault of listing. It is also advi-



sable to dye goods, the surface of which might be impaired by coming into contact with the winch, in hose-form with the wrong side up.

According to the requirements made of the goods, the following classes of colours may be used

1. Acid Colours
2. Anthracene Colours
3. Diamine Colours
4. Eosine Colours.

Owing to their simple method of application and excellent levelling properties, the *Acid Colours* are the most important for the dyeing of piece-goods. They are of the greatest value for dyeing ladies' dress goods of all kinds, plushes, curtain goods, facings and billiard cloths, and are also most extensively employed for gentlemen's suitings. For producing dyeings fast to washing on flannels, such Acid Colours as *Formyl Violet*, *Brilliant Milling Blue*, *Formyl Blue*, *Tetra Cyanole A*, *Alkaline Blue*, *Alphanol Blue*, *Brilliant Milling Green*, *Milling Yellow*, *Milling Red*, *Wool Red* and *Rosazeïne B* are chiefly used, these colours being distinguished by their excellent fastness to washing.

The Acid Colours satisfy normal demands with regard to fastness to rubbing, steaming, alkalies, perspiration and hot pressing. Dyeings of eminent fastness to light are obtained with the following Acid Colours possessing good levelling properties: Alizarine Cyanole, particularly the FF and B brands. Alizarine Cyanole Violet R, Fast Acid Yellow 3G and TL, Orange GG and Brilliant Lanafuchsine BB, GG and SL.

In the case of very high requirements with respect to fastness to light, alkalies and perspiration, or if the goods are to be subjected to a milling process after dyeing, the *Anthracene Colours* (Chrome Colours) are employed. They are especially important for better-class suitings for gentlemen, and for uniform and livery cloths.

The *Diamine Colours* are extensively used for producing colours fast to washing on flannel and hosiery goods.

The *Eosine Colours* serve for dyeing bright, cheap pink and red shades on flannel and low-class blanket materials.

Dark-coloured shoddy goods are principally used for deep shades and blacks. If they are to be dyed to light, brilliant shades, they must be stripped previously, as described in the chapter on Shoddy.

# DYESTUFFS FOR GREY AND MODE SHADES

## Acid Colours

## Diamine Colours

### Of normal Fastness:

Combinations of  
 \*Cyanole Green B, 6G  
 \*Acid Yellow AT  
 \*Fast Acid Yellow TL  
 (for light shades)  
 \*Azo Orseille BB  
 (for light shades)  
 \*Lanafuchsine SG, SB  
 \*Brilliant Lana-fuchsine BB, GG  
 \*Azo Wool Violet 7R  
 Method I, page 4.

For light shades,  
 particularly well  
 levelling:

Combinations of  
 \*Cyanole Green B  
 \*Tetra Cyanole V } for clear Greys  
 \*Cyanole FF }  
 \*Fast Acid Yellow 3G  
 \*Orange GG  
 \*Azo Orseille BB  
 Method I, page 4.

### Eminently Fast to Light:

Combinations of  
 \*Alizarine Cyanole EF  
 \*Alizarine Cyanole SB, SR  
 (for full shades)  
 \*Fast Acid Yellow 3G  
 (for light shades)  
 \*Fast Acid Yellow TL  
 \*Orange GG  
 \*Brilliant Lana-fuchsine GG  
 \*Alizarine Cyanole Violet R  
 Method I, page 4.

### Of very good

### Fastness to Washing:

Combinations of  
 \*Tetra Cyanole A  
 \*Brilliant Milling Green B  
 \*Milling Yellow O  
 Wool Red B  
 \*Milling Red G  
 \*Formyl Violet S4B  
 Method III, page 6.

### Of very good

### Fastness to Washing:

Combinations of  
 Diamine Black DN  
 Diamine Yellow CP  
 Diamine Brown R, M  
 Diamine Catechine G  
 Diamine Scarlet B, 3B  
 Diamine Fast Violet FFBN  
 Method XIV, page 17.

### Of very good Fastness to Washing and Light:

Combinations of  
 Diaminogene extra  
 Diamine Yellow CP  
 Diamine Scarlet B, 3B  
 Diamine Fast Red F  
 Diamine Fast Violet FFBN  
 Method XIV, page 17.

The dyestuffs marked with an asterisk (\*) leave

# ON WOOLLEN AND WORSTED PIECE-GOODS.

## Chrome Colours

### Eminently Fast to Light and Washing:

#### a) After-Chroming Process:

For particularly light shades:

Combinations of

Anthracene Blue Black  
C, KG\*

Anthracene Chrome Blue G

\*Anthr. Yellow BN, RN, GG

Anthracene Chrome

Brown SWN\*, D

\*Anthracene Chrome Red A

\*Anthr. Chrome Violet B

Methods X and XI, p. 12 and 13

#### For Medium and Deep Shades:

Combinations of the above  
and the following dyestuffs:

Anthracene Blue Black  
BE\*, BG

Anthracene Chrome Blue

F\*, BB

Anthracene Chrome

Brown SWR\*, DWN

Methods X and XI,  
page 12 and 13

#### b) On a Chrome Mordant:

For particularly light shades:

Combinations of

Anthracene Blue Black  
C, KG\*

\*Anthracene Yellow BN, RN

Anthracene Chrome

Brown D

\*Anthracene Chrome Red A

Method XIII, p. 15

#### For Medium and Deep Shades:

Combinations of the above  
and the following dyestuffs:

Anthracene Blue Black

BE\*, BG

Anthracene Chrome Blue

G, BB

Anthracene Chromate

Brown EB, WS, WG

\*Anthracene Chrome

Violet B

Method XIII, page 15

#### c) Chromate Process:

For particularly light shades:

Combinations of

Chromate Blue Black B

Anthracene Blue Black C

Anthr. Chromate Grey KB

\*Anthr. Yellow BN, RN, GG

Anthracene Chromate

Brown EB, ER, 3G

\*Anthr. Chromate Violet XB

Method XII, p. 14

For Medium and Deep Shades:

Combinations of the dyestuffs  
in the opposite column and of  
the following:

\*Anthracene Chromate

Grey G

\*Anthracene Chromate

Blue XR

Anthracene Chromate

Brown WS, WG

Method XII,  
page 14

### Of particularly good Fastness to Potting:

Combinations of

\*Anthracene Blue Black BE

Anthracene Chrome Blue F\*, G

Anthracene Yellow C

Anthracene Chrome Brown

SWN\*, D

\*Anthracene Chrome Red A

Method X, page 12.

For subsequent shading see page 16.

cotton, China-grass or artificial silk effects undyed.

## Acid Colours

### Of normal Fastness:

#### Combinations of

- \*Cyanole Green B, 6G
- \*Acid Yellow AT
- Orange II, extra, GG\*  
(for reddish browns and  
prune shades)
- \*Lanafuchsine SG
- \*Brilliant Lanafuchsine  
BB, GG
- \*Azo Wool Violet 7R  
(for prune shades)

Method I, page 4

### Of eminent Fastness to Light:

#### Combinations of

- \*Alizarine Cyanole SR
- \*Fast Acid Yellow TL
- \*Acid Yellow AT  
(as a very strong yellow)
- \*Orange GG  
(for reddish browns and  
prune shades)
- \*Brilliant Lanafuchsine GG
- \*Alizarine Cyanole Violet R  
(for prune shades)

Method I, page 4

### Of very good Fastness to Washing:

#### Combinations of

- \*Tetra Cyanole A
- \*Brilliant Milling Green B
- \*Milling Yellow O  
Wool Red B
- \*Milling Red G
- \*Formyl Violet S4B  
(for prune shades)

Method III, page 6

## Diamine Colours

### Of very good Fastness to Washing:

#### Combinations of

- Diamine Brown R, M, B
- Diamine Catechine G
- Diamine Yellow CP
- Diamine Scarlet B, 3B
- Diamine Black DN
- Oxy Diamine Violet B  
(for prune shades)

Method XIV,  
page 17

### Of very good Fastness to Washing and Light:

#### Combinations of

- Diaminogene extra
- Diamine Yellow CP
- Diamine Scarlet B, 3B
- Diamine Fast Red F
- Diamine Fast Violet  
FFBN  
(for prune shades)

Method XIV,  
page 17

The dyestuffs marked with an asterisk (\*) leave

# ON WOOLLEN AND WORSTED PIECE-GOODS.

## Chrome Colours

### Eminently Fast to Light and Washing:

#### a) After-Chroming Process:

Combinations of	
Anthr. Chrome Brown SWN*, SWR, D, DWN, DW, KDR	Methods X and XI, pages 12 and 13
*Anthracene Yellow BN, RN	
*Anthracene Orange G	
Anthr. Chrome Red A*, G	
Anthracene Blue Black BG, BE*, KG	
Anthracene Chrome Blue BB, F*, R*	
*Anthracene Chrome Violet B (for prune shades)	

#### Cheaper Method:

Combinations of	
Anthracene Acid Brown R, N, B, G	Method X, page 12
Anthracene Chromate Brown EB	
Anthracene Chrome Brown DWN	
*Anthracene Yellow BG	
Anthracene Chrome Black PPC extra	
*Anthr. Chrome Violet B (for prune shades)	

#### b) Chromate Process:

Combinations of	
Anthr. Chromate Brown EB, ER, WG, WS, 3G	Method XII, page 14
*Anthracene Yellow BN, RN	
*Anthracene Orange G	
Anthracene Chrome Red G	
Chromate Blue Black B	
Anthr. Chromate Grey G*, KB	
*Anthr. Chromate Blue XR	
*Anthr. Chromate Violet XB (for prune shades)	

#### Cheaper Method:

Combinations of	
Anthracene Chromate Brown EB, ER, 3G	Method XII, page 14
Anthracene Acid Brown R, B	
*Anthracene Yellow BG	
*Anthracene Chromate Grey G	
*Anthracene Chromate Violet XB (for prune shades)	

#### c) On a Chrome Mordant:

Combinations of	
Anthracene Chromate Brown EB, WS, WG	Anthracene Blue Black BE*, BG, KG
Anthracene Chrome Brown DWN, KDR	Anthracene Chrome Blue BB, G, R*
*Anthracene Yellow BN, RN	*Anthracene Chrome Violet B (for prune shades)
*Anthracene Chrome Red A	

Method XIII, page 15.

### Of particularly good Fastness to Potting:

Combinations of	
Anthr. Chrome Brown SWN*, D	*Anthracene Blue Black BE
Anthracene Yellow C	*Anthracene Chrome Blue F
*Anthracene Chrome Red A	Anthr. Chrome Black PPC extra

Method X, page 12.

For subsequent shading see page 16.

cotton, China-grass or artificial silk effects undyed.

# DYESTUFFS FOR YELLOW, ORANGE AND PINK

## Acid Colours

## Diamine Colours

### YELLOW AND ORANGE.

Of normal Fastness:

\*China Yellow B  
\*Naphtol „ S  
\*Acid Yellow AT  
\*Fast Yellow S  
Metanil Yellow  
Tropaeoline O, OO  
Orange IV, II, extra,  
R  
Method I, page 4.

Of excellent Fastness  
to Light:

\*FastAcidYellowTL  
\*FastAcidYellow3G  
\*Orange GG  
Method I, page 4.

For very bright Oranges:

\*Naphtol Yellow S  
\*Acid Yellow AT  
combined with:  
\*Rosazeïne B  
Method I, page 4.

Of very good  
Fastness to Washing:

\*Milling Yellow O  
combined with  
\*Milling Red G  
\*Rosazeïne B  
Method III, page 6.

Of very good Fastness  
to Washing, and Light:

\*Milling Yellow O  
combined with  
Diamine Scarlet B  
Diamine Fast Red F  
Method III, page 6.

### PINK.

Very bright:

\*Eosine 3G, GGF,  
L, BN  
\*Eosine Scarlet B  
\*Erythrosine  
yellow shade D, B,  
extra N  
\*Phloxine S  
\*Rose Bengale extra  
N  
Method IX, page 11.

Of superior Fastness to  
Light, and good  
Fastness to Washing:

\*Rosazeïne B,  
shaded with:  
\*Milling Yellow O  
Method III, page 6.

Of very good Fastness  
to Light, but less brilliant:

\*Brilliant Lana-  
fuchsine GG, SL,  
BB

shaded with:

\*Fast Acid Yellow 3G  
\*Orange GG  
\*Rosazeïne B  
Method I, page 4.

### YELLOW AND ORANGE.

Of very good

Fastness to Washing:

Thioflavine S  
Oxy Diamine Orange  
G, R  
Diamine Orange B  
Method XIV, page 17.

Of very good  
Fastness to Washing  
and Light:

Diamine Yellow CP  
Diamine Fast  
Yellow FF, 3G  
Diamine Orange F  
or combinations of:  
Diamine Yellow CP  
Diamine Scarlet B  
Diamine Fast Red F  
Rosazeïne B  
(for brightening)  
Method XIV, page 17.

### PINK.

Of very good

Fastness to Washing:

Diamine Rose GD,  
BD, FFB  
Diamine Scarlet B,  
3B

brightened with:  
Rosazeïne B  
Method XIV, page 17.

The dyestuffs marked with an asterisk (\*) leave

## Chrome Colours

Eminently Fast to Light and Washing:

### a) After-Chroming Process:

Yellow and Orange.

Anthracene Yellow GG

aftertreated with chromium  
fluoride (for greenish Yellows)

\*Anthracene Yellow BN,  
RN

\*Anthracene Orange G

combined with

Diamine Fast Red F

Anthracene Chrome Red

A\*, G

Methods X and XI,  
pages 12 and 13

Pink.

Diamine Fast Red F

brightened with

\*Rosazeïne B

Method  
XIV, p. 17

For less brilliant Pink.

\*Anthracene Chrome Red

A

brightened with

\*Rosazeïne B

Method XI,  
page 13

### b) Chromate Process:

Yellow and Orange.

Anthracene Yellow GG

(for greenish Yellows)

\*Anthracene Yellow BN,  
RN

\*Anthracene Orange G

combined with

Diamine Fast Red F

Anthracene Chrome Red G

Method XI, page 14

Pink.

Diamine Fast Red F

brightened with

\*Rosazeïne B

Method XII, page 14

For less brilliant Pink.

Anthracene Chrome Red G

brightened with

\*Rosazeïne B

### c) On a Chrome Mordant (only for Yellow and Orange:

Anthracene Yellow GG

(for greenish Yellows)

\*Anthracene Yellow BN, RN

\*Anthracene Orange G

Method XIII,  
page 15.

Of particularly good Fastness to Potting:

Anthracene Yellow C

shaded with

Diamine Fast Red F

\*Anthracene Chrome Red A

Method X,  
page 12.

cotton, China grass or artificial silk effects undyed.



## DYESTUFFS FOR RED, CLARET AND VIOLET

Acid Colours		Diamine Colours
<p align="center"><b>Red and Claret.</b></p> <p><u>Of normal Fastness:</u></p> <p>*Scarlet FR, F2R, F3R</p> <p>*Brilliant Scarlet 6R</p> <p>*Crystal Scarlet 6R</p> <p>*Brill. Cochineal 4R</p> <p>*Naphtol Red EB, C</p> <p>*Azo Orseille BB</p> <p>*Lanafuchsine SB, BBS</p> <p>*Acid Magenta</p> <p>*Rosazeïne B combined with Orange extra, R</p> <p>*Acid Yellow AT</p> <p><u>Of very good Fastness to Washing:</u></p> <p>*Milling Red G shaded with</p> <p>*Rosazeïne B</p> <p>*Formyl Violet S4B</p> <p>For flannel the following are also used:</p> <p>Scarlet EC, FR*, F2R*, F3R*</p> <p>*Crystal Scarlet 6R</p>		<p align="center"><b>Red and Claret.</b></p> <p><u>Of very good Fastness to Washing:</u></p> <p>Diamine Red 4B, 6B, 10B</p> <p>Diamine Purpurine B, 3B, 6B</p> <p>Diamine Bordeaux S</p> <p><u>Of very good Fastness to Washing and Light:</u></p> <p>Diamine Scarlet B, 3B</p> <p>Diamine Fast Red F</p> <p>Diamine Bordeaux B</p> <p>Diamine Brilliant Bordeaux R</p> <p>Method XIV, page 17.</p>
<p align="center"><b>Violet.</b></p> <p><u>Of normal Fastness:</u></p> <p>*Acid Violet 6BS, 4RS, also 6BC (very fast to alkalis)</p> <p><u>Of Better Fastness to Light:</u></p> <p>*Azo Wool Violet 7R, 4B</p>		<p align="center"><b>Violet.</b></p> <p><u>Of very good Fastness to Washing and Light:</u></p> <p>Diamine Fast Violet FFBN, FFRN</p> <p>Diamine Violet N brightened with</p> <p>Formyl Violet 4BF</p> <p>Alkaline Violet CA</p> <p>Brilliant Milling Blue B</p> <p>Method XIV, page 17.</p>
<p align="center"><b>Of very good Fastness to Light:</b></p> <p>*Brill. Scarlet G—4R</p> <p>*Brill. Cochineal 2R</p> <p>*Azo Rubine A</p> <p>*Lanafuchsine SG, 6B</p> <p><u>Of excellent Fastness to Light:</u></p> <p>Brilliant Croceïne, all brands</p> <p>*Brill. Lanafuchsine GG, SL, BB shaded with</p> <p>*Azo Fast Violet 2R</p> <p>*Alizarine Cyanole Violet R</p> <p><u>Of very good Fastness to Washing and Light:</u></p> <p>*Milling Red FR } Method III, p. 6</p> <p>Wool Red B }</p> <p><u>Of very good Fastness to Washing:</u></p> <p>*Formyl Violet, all brands</p> <p>Method III, page 6.</p>		

The dyestuffs marked with an asterisk (\*) leave



# ON WOOLLEN AND WORSTED PIECE-GOODS.

## Chrome Colours

Eminently Fast to Light and Washing:

### a) After-Chroming Process or

#### b) on a Chrome Mordant:

Red and Claret.

Diamine Fast Red F  
 \*Anthracene Chrome Red A  
 Anthracene Chrome Red G  
 shaded with  
 \*Anthracene Yellow RN, BN  
 \*Anthracene Orange G  
 \*Anthracene Chrome Violet B

Methods X and XI, for dyeing  
 on a chrome mordant: XIII,  
 pages 12, 13 and 15

Violet.

\*Anthracene Chrome Violet B  
 brightened with  
 \*Formyl Violet S4B, 4BF  
 \*Brilliant Milling Blue B  
 \*Tetra Cyanole A

Method XI, combinations  
 with Formyl Violet and  
 Brill. Milling Blue X, for  
 chrome mordant dyeing  
 XIII, pages 12, 13 and 15.

### c) Chromate Process:

Red and Claret.

Diamine Fast Red F  
 Anthracene Chrome Red G  
 shaded with  
 \*Anthracene Yellow RN, BN  
 \*Anthracene Orange G  
 \*Anthracene Chromate Violet XB

Method XII, p. 14

Violet.

\*Anthracene Chromate Violet XB  
 brightened with  
 \*Formyl Violet S4B, 4BF  
 \*Brilliant Milling Blue B  
 \*Tetra Cyanole A

Method XII, p. 14

Of good Fastness to Potting:

Diamine Fast Red F  
 Anthracene Chrome Red A\*, G  
 shaded with  
 Anthracene Yellow C  
 \*Anthracene Chrome Blue F

Method X.  
 page 12.

For subsequent shading see page 16.

cotton, China-grass or artificial silk effects undyed.

## Acid Colours

### Bright Blues.

#### Of normal Fastness:

- \*Cyanole FF, extra
- \*Tetra Cyanole V, SF, extra
- \*Cyanole Navy Blue KR.

#### Of eminent Fastness to Light:

- \*Alizarine Cyanole EF
- \*Alizarine Cyanole B, SR,  
SBR, SB, SG

#### Of good Fastness to Washing:

- \*Brilliant Milling Blue B
- \*Formyl Blue B
- \*Tetra Cyanole A  
further, of still better fastness  
to light:  
Alkaline Blue.

Dyeings of Alkaline Blue should  
be soured off after an alkaline  
washing.

### Navy and Dark Blues.

#### Of normal Fastness:

- \*Azo Wool Blue SER, SE, 6B
- \*Acid Navy Blue KP, A
- \*Azo Navy Blue B, 3B
- \*Brilliant Naphtol Blue  
4B, B, R.

#### Of better Fastness to Light:

- \*Azo Fast Blue B, BD, BR conc.
- Continued in next column.

### Navy and Dark Blues.

#### Of very good Fastness to Light:

- \*Peri Wool Blue B, } Method  
BG, G } II,  
\*Fast Navy Blue B, G } page 5
- \*Lanacyl Blue BB, R, BN, RN  
(Method III, page 6).

#### Cheap Navy and Dark Blues:

- \*Lanacyl Navy Blue B, BB
- \*Azo Navy Blue 3B, G,  
further:
- \*Naphtol Black 3B, 6B
- \*Naphtylamine Blue Black  
5B
- \*Naphtylamine Black  
ES8B, ES3B  
in combination with
- \*Formyl Violet S4B—10B
- \*Brilliant Milling Blue B

Method III, page 6

#### Of very good Fastness to Washing, Alkalies, Perspiration and Light:

- \*Alphanol Blue GN,  
BR extra, 5RN

#### Dark Blue on Cloth for Riding Breeches, very fast to Alkalies and

#### Perspiration:

- Naphtyl Blue BlackN } Method VI  
Alphanol Black KBB } or V, pp. 9  
shaded with } and 8 and  
\*Lanacyl Violet BF } subsequent-  
\*Alphanol Blue } ly treated  
with copper  
sulphate

### Dyestuffs for shading:

#### For normal Fastness

- \*Azo Wool Violet 4B, 7R
- \*Acid Violet 6BS  
Alkaline Violet CA  
(for Alkaline Blue)
- \*Cyanole Green B, 6G  
Orange extra
- \*Fast Acid Yellow TL

#### Very Fast to Light:

- \*Azo Fast Violet 2R
- \*Alizarine Cyanole  
Violet R
- \*Cyanole Fast Green G
- \*Orange GG
- \*Fast Acid Yellow 3G

#### Very Fast to Washing:

- \*Formyl Violet
- \*Brilliant Milling Blue B
- \*Brilliant Milling  
Green B.

The dyestuffs marked with an asterisk (\*) leave

# ON WOOLLEN AND WORSTED PIECE-GOODS.

## Chrome Colours

Eminently Fast to Light and Washing:

### a) On a Chrome Mordant:

Anthracene Chrome Blue	} Method XIII, page 15
BST, RST, BW extra, RRW extra	
Anthracene Acid Blue	
EB*, ER*, KBR*, KBB*, RR	

For less bright Navy  
and Dark Blues:

Anthracene Chrome Blue	} Method XIII, page 15
F*, FR*, G, BB, B*, R*	

Dyestuffs for shading:

- \*Formyl Violet, all brands
- \*Brilliant Milling Blue B
- \*Brilliant Milling Green B
- \*Anthracene Chrome Violet B
- Wool Red B

### b) After-Chroming Process:

*Anthracene Acid Blue	} Methods X and XI, pages 12 and 13
EB, ER, KBR, KBB	
For less bright Navy and Dark Blues:	
Anthracene Chrome Blue	
F*, FR*, G, BB, B*, R*	

For cheaper Navy  
and Dark Blues:

*Azo Chrome Blue	} Methods X and XI, pages 12 and 13
T, TB, AI	
*Anthracene Blue	
Black BE	

Dyestuffs for shading:

- \*Formyl Violet, all brands
- \*Brilliant Milling Blue B
- \*Tetra Cyanole A
- \*Brilliant Milling Green B
- \*Anthracene Chrome Violet B
- Wool Red B.

### c) Chromate Process:

Anthracene Chrome Blue RRW extra  
\*Anthracene Chromate Blue XR  
shaded as stated sub b)  
Method XII, page 14.

Of particularly good Fastness to Potting:

*Anthracene Chrome Blue F	} Method XI, page 13.
Anthracene Chrome Blue G	
Anthracene Chrome Blue BB	

For subsequent shading see page 16.

cotton, China-grass or artificial silk effects undyed.

and stoving see pages 122—125

## Acid Colours

### Of normal Fastness:

#### Combinations of

- |                                |                    |
|--------------------------------|--------------------|
| *Cyanole Green B, 6G           | } Method I, page 4 |
| *Acid Yellow AT                |                    |
| Tropaeoline OO                 |                    |
| Orange IV, II, extra           |                    |
| *Azo Orseille BB               |                    |
| *Brilliant Lanafuchsine BB, GG |                    |
| *Azo Wool Blue 6B              |                    |
| *Tetra Cyanole V               |                    |

#### Brighter Greens.

- |                          |                    |
|--------------------------|--------------------|
| *Acid Green extra conc., | } Method I, page 4 |
| extra conc. B, 5G        |                    |
| shaded with              |                    |
| *Naphtol Yellow S        |                    |
| *Acid Yellow AT          |                    |
| *Tetra Cyanole SF, V     |                    |

### Of better Fastness to Light:

#### Combinations of

- |                            |                    |
|----------------------------|--------------------|
| *Cyanole Fast Green G      | } Method I, page 4 |
| *Fast Acid Yellow TL       |                    |
| *Acid Yellow AT            |                    |
| *Orange GG                 |                    |
| *Brilliant Lanafuchsine GG |                    |
| *Azo Fast Blue BD          |                    |

### Eminently Fast to Light:

#### Combinations of

- \*Alizarine Brilliant Green G
  - Naphtol Green B
  - \*Fast Acid Yellow 3G, TL
  - \*Orange GG
  - \*Brilliant Lanafuchsine GG
  - \*Alizarine Cyanole EF
  - \*Alizarine Cyanole SR
- (for deep shades)

### For Bright Greens Fast to Alkalies (Billiard Greens).

- |                          |                    |
|--------------------------|--------------------|
| *Cyanole Fast Green G    | } Method I, page 4 |
| *Tetra Cyanole SF        |                    |
| shaded with              |                    |
| *China Yellow B          |                    |
| *Acid Yellow AT          |                    |
| *Fast Acid Yellow TL, 3G |                    |

### Of good Fastness to Washing:

#### Combinations of

- |                            |                      |
|----------------------------|----------------------|
| *Brilliant Milling Green B | } Method III, page 6 |
| *Tetra Cyanole A           |                      |
| *Milling Yellow O          |                      |
| Wool Red B                 |                      |

### Of good Fastness to Washing and

### better Fastness to Light:

#### Combinations of

- |                       |                      |
|-----------------------|----------------------|
| *Cyanole Fast Green G | } Method III, page 6 |
| *Alizarine Brilliant  |                      |
| Green G               |                      |
| *Milling Yellow O     |                      |
| Wool Red B            |                      |

The dyestuffs marked with an asterisk (\*) leave

Dyeings produced with Brilliant Milling Green B turn somewhat lighter  
souring off

# ON WOOLLEN AND WORSTED PIECE-GOODS.

## Chrome Colours

Eminently Fast to Light and Washing:

### a) After-Chroming Process:

Combinations of

- \*Alizar.Brill.Green G, SE
- \*Anthracene Chromate
- Green KFF extra
- Anthracene Chrome Blue
- G, BB, F\*
- Anthracene Yellow
- BN\*, RN\*, GG
- Anthracene Chrome
- Brown D, DWN, SWN\*
- \*Anthrac. Chrome Red A

Method X and XI,  
pages 12 and 13

Brighter Greens.

- \*Alizar.Brill.Green G, SE
- \*Anthracene Chromate
- Green KFF extra
- shaded with
- Anthrac. Yellow BN\*, GG
- \*Brilliant Milling Green B

Method X,  
page 12

### b) On a Chrome Mordant:

Combinations of

- \*Alizar.Brill.Green G, SE
- \*Anthracene Chromate
- Green KFF extra
- Anthracene Chrome Blue
- G, BW extra
- Anthracene Yellow
- BN\*, GG
- Anthracene Chromate
- Brown EB, WS, WG
- \*Anthrac. Chrome Red A

Method XIII, page 15

Brighter Greens.

- \*Alizar.Brill.Green G, SE
- \*Anthracene Chromate
- Green KFF extra
- shaded with
- Anthrac. Yellow BN\*, GG
- \*Brilliant Milling Green B

Method XIII,  
page 15

### c) Chromate Process:

Combinations of

- \*Alizar.Brill.Green G, SE
- \*Anthr. Chromate Green
- KFF extra, B
- Chromate Blue Black B
- \*Anthr.Chromate Blue XR
- Anthr. Yellow BN\*, GG
- Anthr.Chromate Brown EB

Method XII, p. 14

Brighter Greens.

- \*Alizar.Brill.Green G, SE
- \*Anthracene Chromate
- Green KFF extra, B
- shaded with
- Anthrac. Yellow BN\*, GG
- \*Brilliant Milling Green B

Method XII,  
page 14

Of good Fastness to Potting:

Combinations of:

- Anthrac. Chrome Blue G, BB
- Anthrac. Chrome Brown D, SWN\*
- Anthracene Yellow C
- \*Anthracene Chrome Red A

Method X, page 12.

For subsequent shading see page 16.

cotton, China-grass or artificial silk effects undyed.

by a severe alkaline treatment, but the original shade will return on subsequently.

## Acid Colours

Direct Blacks of very good Fastness to Light and normal Fastness to Alkalies and Perspiration

### for Plain Goods

For Bluish Blacks.

Naphtylamine Black 4B, 6B

For more covered Blacks.

Naphtylamine Black X2B, X3B

Further, the brands stated in the next column for cloths with shot effects.

Of superior Fastness to Alkalies and very good Fastness to Washing:

for Blue-Black	{	Naphtylamine Blue
		Black N
{	Alphanol Black BG,	
	3BN, KBB, K4B	

for Jet Black	{	Alphanol Black
		KWAN conc., KV

Alphanol Blacks are used particularly for union goods with fast black warps (for alpaca, serge etc.).

Possessing particularly good

Levelling Properties:

Azo Merino Black, all brands

The Azo Merino Black brands are used particularly for cashmeres and other light cloths.

Regarding a substitute for iron and logwood black on drapé etc. and regarding Combination-blacks see pages 129—132.

Dyestuffs for shading:

As per next column; for Jet Black, also Orange II and extra are used.

### For Cloths containing Shot Effects

For Bluish Blacks.

Naphtylamine Black EFF  
(the effects remain entirely unstained)

Naphtylamine Black ESSB,  
ES3B, ESN, 7BS, 4BS, S,  
SG

Naphtylamine Blue Black 5B  
Naphtol Black 6B, 3B, 2B  
Naphtol Blue Black S.

For more covered Blacks.

Naphtylamine Black HWN,  
T, TJ, TN, SS2B, SS3B  
Naphtylamine Blue Black B  
Naphtol Black B, SG

For Ladies' Dress Materials with Shot Effects the following are

largely used:

for Blue-Black	{	Azo Merino Black 8B,
		6B, 6BE, 6BN, 3BN

for Jet Black	{	Azo Merino Black B,
		BE, BN.

Dyestuffs for shading:

For Blue-Black:

Acid Violet 6BS, Tetra Cyanole V,	
Cyanole Green B, 6G	
Acid Green extra conc.	
Formyl Violet, all brands	} for dyeings fast to washing
Brilliant Milling Blue B	
Brilliant Milling Green B	

For Jet Black:

Acid Yellow AT, Orange GG	
Tropaeoline O	} for dyeings fast to washing.
Milling Yellow O	

# ON WOOLLEN AND WORSTED PIECE-GOODS.

## Chrome Colours

Chrome Blacks of Very Good Fastness to Light, Alkalies, Perspiration and Washing

### For Plain Goods

For Bluish Blacks.

Anthracene Chrome Black F,5B  
Anthracene Acid Black  
DSFB, DNG

For more covered Blacks.

Anthracene Chrome Black FE  
Anthracene Acid Black  
DSF, DSN

Possessing particularly good

Levelling Properties:

Anthracene Acid Black SR,  
SRG, also SBB (for Blue-Black).

Of very good Fastness to Light

and Potting:

Anthracene Chrome Black  
PPC extra, KV, PPN extra,  
Pextra, PFextra, PFBextra,  
PPS extra, PBB, KEG  
(the last-named three brands have  
a very strongly bluish cast)  
Anthracene Chrome Black  
PPT extra, PFR extra  
(for covered Blacks).

Dyestuffs for Shading (for Plain Goods and for Cloths containing  
Shot Effects):

For Blue-Black:

Formyl Violet, all brands  
Brilliant Milling Blue B  
Brilliant Milling Green B

Anthracene Chrome Blue F  
Anthracene Blue Black BE  
Anthracene Chrome Violet B

for dyeings  
particularly  
fast to light  
and potting

### For Cloths containing Shot Effects

Anthracene Acid Black  
SR, SRT.

Of still better Fastness to Alkalies  
and Perspiration:

Anthracene Acid Black ST.

At the same time of very good  
Fastness to Light and Potting:

Anthracene Chrome Black  
PPS extra  
(with a strongly bluish cast)  
Anthracene Chrome Black  
PPN extra

Anthracene Acid Black ST, SRT  
and Anthracene Chrome Black PPS  
extra are also used for union linings  
(italians, serges etc.) with a fast  
black warp which frequently contain  
at the same time white or coloured  
cotton effects.

For cheap Blacks somewhat inferior  
in fastness as compared with the  
products mentioned above:

Naphtylamine Black Cr.

For Jet Black:

Anthracene Yellow BN  
Anthracene Orange G  
Anthrac. Chrome Red A

at the same  
time for  
dyeings par-  
ticularly fast  
to light and  
potting

For subsequent shading see page 16.



SPECIAL PROPERTIES OF FASTNESS OF THE DYESTUFFS  
MENTIONED IN THE TABLES ON PAGES 108—121.

*Dyestuffs Fast to Steaming:*

The afore-mentioned dyestuffs are of good fastness to steaming, with the exception of the following brands, which more or less change their shade on severe steaming, but withstand a normal steaming quite well.

Scarlet EC	Naphtyl Blue	$\left. \begin{array}{l} \text{Black N} \\ \text{Alphanol Black,} \\ \text{all brands} \end{array} \right\} \begin{array}{l} \text{died wit-} \\ \text{hout} \\ \text{copper} \\ \text{sulphate} \end{array}$
Brilliant Croceine 6B, 7B, 9B		
Croceine AZ		
Eosine BN		
Eosine Scarlet B	Naphtylamine Black	
Erythrosine, all brands	4B, X2B, X3B	
Rose Bengale extra N	Diamine Brown 3G, R	
Lanacyl Violet BF, B	Diamine Catechine G	
Lanacyl Blue, all brands	Diamine Red 4B, 10B	
Lanacyl Navy Blue BB	Diamine Fast Violet	
Azo Merino Blue G, 3B	FFBN, FFRN	
Fast Navy Blue B, G	Oxy Diamine Violet B	
Peri Wool Blue B, BG	Diamine Black DN	
Alphanol Blue, all brands	Diaminogene extra	
Naphtol Green B	Anthracene Chrome Red G	
	Anthracene Chromate	
	Green B.	

*Dyestuffs Fast to Carbonising:*

All the dyestuffs enumerated in the tables, with the exception of

Tropaeoline OO	$\left. \begin{array}{l} \text{change but very} \\ \text{slightly in shade} \\ \text{and prove satis-} \\ \text{factory for most} \\ \text{purposes} \end{array} \right\}$	Peri Wool Blue, all brands
Orange IV		Acid Violet 4RS
Lanafuchsine 6B		Eosine, all brands
Azo Wool Violet 7R		Oxy Diamine Orange G, R
Fast Navy Blue B		Diamine Brilliant
Lanacyl Blue BB, R		Bordeaux R
		All combinations with logwood.

Carbonising neutralises the effect of copper sulphate in the case of

Naphtyl Blue Black N  
Alphanol Black, all brands.



Dyeings produced with the following dyestuffs must be neutralised well after carbonising:

Metanil Yellow	Diamine Red	} all brands
Naphtol Dark Green G	Diamine Purpurine	
Azo Merino Black	Diamine Bordeaux B	
8B, 6B, 6BE, B, BE	Anthracene Yellow	
Thioflavine S	BN, RN, GG	
Diamine Fast Yellow 3G	Anthracene Orange G	
Diamine Brown R	Anthracene Chrome Brown	
	D, SWN, SWR	
	Anthracene Chrome Red G	

*Dyestuffs Fast to Stoving:*

All the dyestuffs mentioned, with the exception of

Fast Yellow S	Naphtyl Blue Black N
Metanil Yellow	Naphtylamine Black 4B, 6B,
Tropaeoline OO	X2B, X3B, 7BS, 4BS,
Orange IV	S, SGG, T, TJ, TN,
Brilliant Scarlet 2R, 3R, 4R	SS2B, SS3B
Scarlet EC	Naphtol Black B, 2B, SG

Brilliant Croceïne,  
all brands

All combinations with  
logwood.

Croceïne AZ	Diamine Fast Yellow 3G
Amaranth	Diamine Brown R
Naphtol Red C, EB	Diamine Catechine G
Milling Red FR	Diamine Scarlet B
Wool Red B	Diamine Bordeaux B, S
Acid Magenta	Diamine Black DN
Acid Violet 4RS	Diaminogene extra
Azo Fast Violet 2R	Anthracene Yellow
Lanacyl Violet BF, B	BN, RN, BG
Alkaline Blue	Anthracene Orange G
Lanacyl Blue	Anthracene Acid Brown
Pery Wool Blue	G, R, N, B
Alphanol Blue	Anthracene Chrome Brown
Fast Navy Blue B, G	D, DWN, KDR
Azo Merino Blue G, 3B	Anthracene Chromate
Lanacyl Navy Blue B, BB	Brown 3G, EB, WS, WG
Azo Fast Blue, all brands	Anthracene Chrome Red G
Azo Wool Blue SER, 6B	Anthracene Acid Black
Acid Navy Blue KP	ST, SRT.
Acid Green, all brands	
Alphanol Black, all brands	

The following are fairly fast to stoving and sufficient for most purposes:

Tropaeoline O	Oxy Diamine Orange R
Brilliant Scarlet R, 6R	Diamine Brown 3G
Crystal Scarlet 6R	Diamine Scarlet 3B
Brilliant Croceïne R	Diamine Red, all brands
Milling Red G	Diamine Fast Violet
Formyl Violet 6B, 8B, 10B	FFBN, FFRN
Naphtol Green B	Anthracene Yellow C, GG
Naphtol Dark Green G	Anthracene Chrome Brown
Naphtylamine Black	DW, SWN, SWR
ESN, HWN	Chromate Blue Black B
Naphtylamine Blue Black B	Anthracene Chrome Black FE
Azo Merino Black BN	Anthracene Acid Black
Naphtol Black 3B, 6B	DSF, DSN, DSFB.
Diamine Orange B	

*Acid Colours Fast to Hot Pressing and Calendering*  
(for Ladies' Costume Cloths and Cheap One-Coloured Gentlemen's Cloths.)

The following Acid Colours are of very good fastness to hot pressing and calendering:

The shade is either not changed at all or only slightly so; in the latter case the original shade returns at once when the goods become cold.

Fast Acid Yellow 3G, TL	Alkaline Violet CA
Acid Yellow AT	Brilliant Milling Blue B
China Yellow B	Tetra Cyanole, all brands
Naphtol Yellow S	Alizarine Cyanole EF
Metanil Yellow	Azo Wool Blue SE
Indian Yellow, G	Azo Navy Blue B
Milling Yellow O	Azo Fast Blue, all brands
Orange GG, EN, ENZ	Acid Navy Blue A
Brilliant Lanafuchsine	Acid Green, all brands
GG, BB	Naphtylamine Black,
Lanafuchsine 6B	all brands
Brilliant Scarlet GG	except 4B, 6B, X2B, X3B
Brilliant Croceïne R, 2B	Naphtylamine Blue Black
Croceïne AZ	5B, B
Azo Rubine A	Naphtyl Blue Black N
Azo Wool Violet 7R, 4B	Naphtol Blue Black }
Acid Violet 6BC	Alphanol Black } all brands
Formyl Violet 6B, 10B	Naphtol Black 3B, 6B

The following Acid Colours are fairly fast to hot pressing and calendering, and suffice for most cases:

(The shade is slightly changed by hot-pressing and calendering, but quickly returns on the cooling of the goods.)

Fast Yellow S	Alizarine Cyanole SB
Tropaeoline OO	Azo Wool Blue SER, 6B
Indian Yellow FF, R	Brilliant Naphtol Blue
Orange IV	4B, B
Lanafuchsine SB	Acid Navy Bue KP
Naphtol Red EB, C	Lanacyl Blue BB
Brilliant Croceïne 5B, 7B, 9B	Naphtol Green B
Milling Red G, FR	Naphtol Dark Green G
Acid Violet 6BS	Naphtylamine Black
Formyl Violet S4B, S5B, 4BF	4B, 6B, X2B, X3B
Formyl Blue B	Naphtol Black B, SG.

#### WOOL DYESTUFFS GIVING A YELLOW NITRIC ACID TEST.

Dyeings produced with the following dyestuffs, when spotted with concentrated nitric acid, yield a yellow to reddish yellow spot (the so-called "Indigo test"):

Fast Acid Yellow TL, 3G	} reddish yellow spot.
Acid Yellow AT	
Lanafuchsine 6B	
Lanafuchsine SG, SB	
Rosazeïne B	reddish yellow spot.
Eosine	} all brands
Erythrosine	
Phloxine	
Rose Bengale extra N	
Acid Violet 6BS	
Acid Violet 6BC	} reddish yellow spot
Formyl Violet S4B, S5B, 4BF	
Alkaline Violet CA	
Brilliant Milling Blue B	
Formyl Blue B	
Cyanole FF, extra	
Alizarine Cyanole SBR, SB, SG	} reddish yellow spot.
Tetra Cyanole A	

Tetra Cyanole V, SF, extra	
- Cyanole Navy Blue KR	
Lanacyl Blue BN, RN	} reddish yellow spot
Cyanole Fast Green G	
Brilliant Milling Green B	
Acid Green, all brands	
Anthracene Chrome Blue BST, RST	} a dirty yellow spot
Anthracene Acid Blue EB, ER, KBB, KBR	
Anhracene Blue Black BE	

#### INCREASING THE FASTNESS TO PERSPIRATION AND STEAMING.

a) By a Treatment with Copper Sulphate.

The fastness to perspiration, and particularly also the fastness to steaming, of dyeings of

Naphtyl Blue Black	} all brands
Alphanol Black	
Alphanol Blue	

are very considerably improved by a treatment with copper sulphate in the exhausted dyebath.

Charge the bath with 3% copper sulphate, reckoned on the weight of the material. and treat without steam for 20 to 30 minutes. In order to ensure the desired result of increased fastness, no bisulphate of soda or sulphuric acid should be used in the dyeing.

b) By a Treatment with Formaldehyde.

The fastness to steaming, and especially also the fastness to perspiration, of

Lanacyl Blue BB, BN, R, RN

are very considerably increased by an aftertreatment with formaldehyde.

Dye in the customary manner with the addition of Glauber's salt and acetic acid, add

2—3% formaldehyde 40%

to the exhausted bath, and boil for another  $\frac{1}{2}$  hour.

#### INCREASING THE FASTNESS TO WATER BY A SUBSEQUENT TREATMENT WITH TANNIC ACID.

The fastness to water of all dyestuffs is considerably improved by a simple treatment of the dyed goods with tannic acid.

A treatment of this kind is particularly important for dyeings on cloth for facings (for instance greens dyed with Brilliant Milling Green or Cyanole Fast Green) and for bunting.

The method of working is as follows:

The dyed and rinsed goods are treated for 20 to 30 minutes in a short bath heated to about 30° C. (85 deg. F.) containing 8 oz pure tannic acid per 10 gallons liquor, and then hydroextracted and dried without rinsing.

The shade is not changed at all or only very slightly. For bright shades it is advisable to use a very pure quality of tannic acid.

#### COBBLING DEFECTIVELY DYED PIECES.

##### *Goods dyed with Acid Colours.*

Goods which have been dyed too deep a shade are stripped by boiling for 30 to 40 minutes in a fresh liquor charged with 10—20% Glauber's salt crystals, or, with 5—10% acetate of ammonia\*, to which 1% ammonia (liquor of ammonia) may be added; they are then rinsed, and dyed to shade in a fresh acid bath.

Goods which have been dyed too deep a shade with levelling colours are frequently stripped by boiling for some time in water together with a white piece.

Pieces with an uneven or skittery appearance, or pieces which are not well penetrated, are often corrected by adding a large quantity of Glauber's salt to the old dyebath and boiling hard for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour. Should this not produce satisfactory results, the goods are best stripped by boiling for  $\frac{1}{2}$  hour in a fresh bath charged with

10% acetate of ammonia\* and

1% ammonia

and then causing the pieces to absorb the stripped colour again by boiling with the addition of some acid.

If these methods do not yield the desired effect, it is best to strip the material with Hyraldite\*\*.

---

\* For the preparation of acetate of ammonia see appendix.

\*\* Hyraldite must always be stored in well-closed receptacles kept in a cool, dry place. Hyraldite Z for Stripping is added in the dry state straight to the stripping bath, whereas the other brands are dissolved in warm water before use.

The stripping with Hyraldite is carried out in a clean wooden vat, the steam pipe of which is wrapped round with a piece of cotton cloth.

Prepare a short lukewarm bath with

2	—4	% Hyraldite Z for Stripping	} of the weight of the goods, and according to the depth of shade and the resistance of the dyeings to such a treatment;
		and	
2½	—5½	% formic acid 85% or	
1	—2	% sulphuric acid 168° Tw., or,	
2	—4	% Hyraldite Z soluble conc.	
1	—2	% formic acid 85%	

enter the goods to be stripped straightaway, heat in about ½ hour to the boil, and continue boiling for 10 to 20 minutes, according to requirement. Then rinse first in cold and then in hot water acidulated with sulphuric acid, rinse again, and re-dye.

Instead of Hyraldite Z for Stripping and Hyraldite Z soluble conc., Hyraldite A and C extra may equally well be used, the following being the quantities required:

5—10% Hyraldite A or 2,5—5% C extra with  
5—10% acetic acid 30%, or with bisulphite 64° Tw.

#### *Goods dyed with Chrome Colours or Diamine Colours.*

The most suitable stripping agent for Chrome or Diamine Colours is Hyraldite, satisfactory results being but rarely obtained with ammonia or acetate of ammonia. The method of working is the same as stated above.

#### DYEING OF VEGETABLE IMPURITIES.

(Burls, Burrs, Threads, Straw, etc.)

If only a few burls or burrs are noticeable after dyeing, they are removed by means of the burling iron in the usual manner: in dark-coloured goods the burls etc. are stained with burling ink.

For goods containing large quantities of burls, such a proceeding is however impracticable; such goods must then either be carbonised, or, better still, burl-dyed with Diamine Colours.

Most of our dyestuffs withstand subsequent carbonising very well, as is indicated in the tables on pages 122 and 123. If, after dyeing, the goods are neutralised with soda or ammonia, the last rinsing bath is acidulated to advantage with some acetic or formic acid.

Burl-dyeing with Diamine Colours is exceedingly simple, and is carried out in the washing machine after the rinsing of the dyed goods.

The following dyestuffs come into consideration for this purpose:

Diamine Black RMW	} for deep shades and Black	Diamine Nitrazol Brown B, G
Diamine Black BH		Diamine Brown S
Diamine Sky Blue FF		Diamine Heliotrope B, O, G
Diamine Blue 2B, 3B		Oxy Diamine Violet B
Diamine Fast Blue FFB		Diamine Rose BD, GD, FFB
Diamine Fast Yellow A		Direct Rose T
Diamine Fast Orange ER		Diamine Purpurine 6B
Diamine Orange G, D		Diamine Red 10B.
Diamine Fast Brown G, R, GB		

### *Method of Dyeing:*

The acid-dyed pieces are first thoroughly rinsed in the washing machine; then a cold bath as short as possible is prepared in the dye-vat, charged according to the depth of shade with

$\frac{3}{4}$ oz soda ash	} per 10 gallons liquor.
1—2 lbs Glauber's salt crystals	
$\frac{3}{8}$ —3 oz Diamine Colour	

The goods are worked in this bath for 20 to 40 minutes, and again rinsed. The last rinsing bath is to advantage feebly acidified with acetic or formic acid. Goods containing very hard cotton burls are best left lying unrinsed overnight, being made ready the next morning in the manner described above.

### **Naphtyl Blue Black and Naphtylamine Black in Combination with Logwood and Sumac.**

#### *Logwood Combination (so-called Combination-Black).*

The combination of Acid Black and Logwood is used extensively for worsteds and for woollen cloth. By this method bluish black shades with a very fine lustre and handle are obtained, such dyeings working out cheaper



and possessing considerably better fastness to light than dyeings of pure logwood. According to requirement, the dyeings may be shaded with Brilliant Milling Green B, Naphtol Dark Green G or Anthracene Yellow C, and for Jet Blacks, they may be saddened with fustic extract.

The following dyestuffs are best suited for Combination-Black:

Naphtyl Blue Black N	
Naphtylamine Black 4B, 6B, 19J, ESN	
Naphtylamine Blue Black B	
Naphtylamine Blue Black 5B	} for bluish blacks
Naphtylamine Black 7BS	
Naphtylamine Black X2B	} for particularly cheap blacks
Naphtylamine Black X3B	

Naphtyl Blue Black N, Naphtylamine Black 7BS, ESN, 6B and Naphtylamine Blue Black 5B and B yield the best dyeings in point of fastness to light.

### *Method of Dyeing:*

Charge the bath with

2—3% oxalic acid (according to the hardness of the water) and

10—20% Glauber's salt crystals,

add the requisite quantity of dyestuff and logwood extract or hematine crystals, if necessary some fustic extract also, and boil up the bath. Enter the well wetted goods, and work for 20 to 30 minutes without steam, then for about 1 hour at the boil. If by this time the bath has not assumed a yellowish brown colour (an indication that the black dyestuff has not yet all been absorbed), boiling is continued for another 15 to 20 minutes with the addition of  $\frac{1}{2}$ —1% oxalic acid. Then add

6% copperas and

3% copper sulphate

and boil for another  $\frac{3}{4}$  hour.

After dyeing, rinse very thoroughly, or, if necessary, wash with fuller's earth, adding some acetic acid.



Another method of working employed in some dye-houses, which yields however dyeings of not quite such good fastness to light, is as follows:

Charge the dyebath first with

4—6% copperas and  
2—3% copper sulphate,  
logwood extract or hematine crystals  
and, if necessary, fustic extract;

then add oxalic acid (on an average 2% of the weight of the goods) until the black precipitate in the bath is dissolved and the liquor has assumed a yellowish colour.

Then add the requisite quantity of Naphtyl Blue Black, Naphtylamine Black or Naphtylamine Blue Black in solution. Enter at 60—70° C. (140—160 deg. F.), raise in 20 minutes to boiling point, and boil for about 1¼ hours, when ½—1% oxalic acid may be added in order to better exhaust the bath. Then rinse the goods thoroughly, or wash if necessary with fuller's earth, adding some acetic acid.

### *Naphtyl Blue Black N in Combination with Sumac.*

This combination is used extensively as a substitute for *iron-logwood black*, especially for better-class worsteds for gentlemen's wear (dress suitings, etc.).

It imparts to the goods the full handle and high lustre peculiar to materials dyed with logwood and iron, and besides effects an increase in the weight by about 6—8%. Over the iron black it offers the great advantage of a simpler and quicker method of dyeing, considerably better fastness to light and acids, of leaving cotton lists or effect threads much cleaner, and covering vegetable impurities of the wool, such as burrs, particles of jute, wood and straw exceedingly well.

In order to ensure good fastness to rubbing, it is sufficient to rinse the dyed pieces in cold water for ½—¾ hour, whereas iron-logwood black has to be washed for several hours with fuller's earth.

Charge the dyebath with

- |      |     |                              |                           |  |
|------|-----|------------------------------|---------------------------|--|
| 3    | —   | 4                            | %                         | oxalic acid (according to the hardness of the water) |
| 20   | %   | Glauber's salt crystals      |                           |  |
| 5    | —   | 7                            | %                         | Naphtyl Blue Black N                                 |
| 0.2— | 0.5 | %                            | Brilliant Milling Green B |  |
| 7    | %   | sumac extract of 52 deg. Tw. |                           |  |

Boil up the bath, shut off steam, enter the goods, and work for  $\frac{1}{2}$  hour without steam and then for about 1 hour at the boil. Should the bath by that time not be exhausted, add another  $\frac{1}{2}$ —1% oxalic acid or formic acid to the bath.

After exhaustion of the bath add

- |    |                     |
|----|---------------------|
| 3% | copper sulphate and |
| 4% | copperas,           |

boil for another 30 minutes, and rinse in cold water for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour.

The dyebath may be used for dyeing subsequent lots. Add oxalic acid until the precipitate which has formed is completely dissolved, hereafter 5% Glauber's salt, and then the dyestuff and  $3\frac{1}{2}$ —4% sumac extract, proceeding otherwise in the same manner as for the first lot.

In addition to Naphtyl Blue Black N, the following dyestuffs are particularly well suited for the process:

- |                                    |
|------------------------------------|
| Alphanol Black BG, 3BN and KBB     |
| Naphtylamine Black 4B, 6B and ESN. |

### Acid Colours in Combination with Logwood for the Production of Navies and Dark Blues.

Such a combinations yields very cheap navies and dark blues, though not of a very good resistance to light, and is therefore used in the first place for cheap materials, particularly for shoddy goods.

The following dyestuffs come chiefly into consideration for this purpose:

For bright navies and dark blues:

Formyl Violet S4B, 4BF  
Alkaline Violet CA  
Brilliant Milling Blue B  
Water Blue B, R  
Wool Blue TB.

For dull navies and dark blues:

Solid Blue R, 3R.

For navies and dark blues of better fastness to light:

Lanacyl Blue BB, BN, R, RN  
Lanacyl Navy Blue B, BB  
Lanacyl Violet BF, B.

### *Method of Dyeing:*

Dye either according to the one-bath method with the addition of copperas, copper sulphate and oxalic acid, or, by the two-bath method on a mordant of chrome and tartar, or of chrome, copper and sulphuric acid.

The dyeings produced according to the one-bath method work out at a very low cost; dyeings on chromed goods on the other hand offer the advantage of greater brightness and better fastness to rubbing.

#### *A. Dyeing according to the One-Bath Method:*

Charge the dyebath first with

4% copperas  
3% copper sulphate  
30—50% logwood chips;

then add sufficient oxalic acid (about  $1\frac{1}{2}$ —2% of the weight of the goods) to dissolve the precipitate formed in the bath and to make the liquor assume a yellowish colour, hereafter adding the requisite quantity of Acid Colour in solution.

Enter the wetted out goods at about 60° C. (140 deg. F.), raise in  $\frac{1}{2}$  hour to the boil, continue boiling for 1 hour, and exhaust, if necessary, with the addition of  $\frac{1}{2}$ —1% oxalic acid well diluted with cold water.

After dyeing, rinse very thoroughly, or, if necessary, wash with fuller's earth and the addition of some acetic acid.

Should a subsequent shading with Acid Colours be required, the dyebath must first be cooled off somewhat and then heated up again gradually after the addition of the dyestuff.

### *B. Dyeing according to the Two-Bath Method.*

Mordant the goods as usual for  $1\frac{1}{2}$  hours at the boil with

3 % bichrome and  $2\frac{1}{2}$  % tartar,      { or with }  $1\frac{1}{2}$ —2% bichrome and  $1\frac{1}{2}$ —2% formic acid 85 %

or again with { 3 % bichrome,  
                           $1\frac{1}{2}$  % copper sulphate and  
                           $1\frac{1}{2}$  % sulphuric acid;

then rinse well, and dye in a fresh bath.

Charge the dyebath first with the requisite quantity of the Acid Colour and logwood, enter the goods at 60° C. (140 deg. F.), raise in  $\frac{1}{2}$  hour to the boil, and exhaust the bath after  $\frac{3}{4}$  hour's boiling by the gradual addition of

3—5 % acetic acid or  
1— $1\frac{1}{2}$  % sulphuric acid;

then rinse thoroughly.

Acid Colours may be used for subsequent shading, as indicated under (A).

### Production of Pastil Colours.

Specially clear and delicate shades, so-called Pastil Colours, are produced on piece-goods, usually woollen cloth and superior qualities of worsted pieces, in the following manner:

The pieces, if not a pure white already, are bleached with hydrogen or sodium peroxide according to the directions on page 51, and then dyed with suitable Acid Colours to about half the depth of the shade of the pattern to be matched. After rinsing in a washing machine, they are brought up to shade in a cold bath containing zinc white or whitening.

Very light shades and White are produced direct in a cold bath charged with zinc-white or chalk, as described on page 137.

a) *Preliminary Dyeing of the Goods in an Acid Bath.*

For this purpose the following dyestuffs come mainly into consideration:

For Grey and other Compound Shades:

Combinations of

Tetra Cyanole V, SF  
Fast Acid Yellow 3G  
Orange GG  
Azo Orseille BB  
Acid Violet 6BS

Of better fastness to light:

Alizarine Cyanole EF  
Fast Acid Yellow 3G  
Orange GG  
Brilliant Lanafuchsine GG  
Alizarine Cyanole Violet R

Method I,  
page 4.

For Yellow and Orange:

China Yellow B  
Acid Yellow AT  
Orange extra, R

Of better fastness to light:

Fast Acid Yellow 3G, TL  
Orange GG

Method I,  
page 4.

For Pink:

Rosazeïne B  
shaded with  
Orange GG

Method III,  
page 6.

Of better fastness to light:

Brilliant Lanafuchsine GG, SL, BB  
shaded with  
Orange GG

Method I,  
page 4.

For Violet:

Acid Violet 6BS, 6BC  
Formyl Violet 4BF  
shaded with  
Cyanole FF  
Azo Wool Violet 7R  
Brilliant Milling Blue B

Of better fastness to light:

Alizarine Cyanole Violet R  
Azo Fast Violet 2R  
shaded with  
Alizarine Cyanole EF  
Cyanole FF

Method I,  
for Formyl Violet  
Method III,  
pages 4 and 6.

For Blue:

Cyanole FF  
Tetra Cyanole SF, extra, V  
shaded with  
Acid Violet 6BS

Of better fastness to light:

Alizarine Cyanole EF, B, SB  
shaded with  
Alizarine Cyanole Violet R  
Cyanole FF  
Cyanole Fast Green G

Method I,  
page 4.

For Green:

Brilliant Milling Green B  
Fast Acid Green BN  
shaded with  
China Yellow B  
Acid Yellow AT  
Tetra Cyanole V

Of better fastness to light:

Cyanole Fast Green G, V  
Alizarine Brilliant Green G  
shaded with  
Fast Acid Yellow 3G  
Alizarine Cyanole EF

Method I,  
for Brilliant Milling  
Green and Alizarine  
Brilliant Green  
Method III,  
pages 4 and 6

The dyeing is carried out according to the respective directions; it is advisable however not to enter the goods too hot, on account of the very small quantities of dyestuff used. In order to obtain the clearest possible shades, clean vessels should be used, and the boiling should be reduced as far as possible.

In the case of bleached pieces it is an advantage to add to the dyebath 2% monopol soap, which imparts a good soft handle to the goods.

*b) Subsequent Dyeing of the Goods and Direct Production of Pale Shades in a Zinc-White or Chalk Bath.*

The dyestuffs best suited for this purpose, which may be mixed at will, are the following:

China Yellow B	Alizarine Cyanole Violet R
Diamine Yellow CP	(for best fastness to light)
Orange extra, R	Brilliant Milling Blue B
Rosazeine B	Tetra Cyanole SF
Alkaline Violet CA	Alizarine Cyanole EF
Formyl Violet 4BF	(for best fastness to light)
	Brilliant Milling Green B.

For White, the following dyestuffs come first of all into consideration:

Brilliant Milling Blue B	} for Milk White
Alizarine Cyanole EF (for best fastness to light)	
Alkaline Violet CA	} for Ivory White.
Alizarine Cyanole Violet R (for best fastness to light)	

The dyeing is best carried out in a clean washing machine or in some other vessel suitable for the purpose, provided with squeezing rollers. The cold bath is charged, according to the desired effect, with  $\frac{3}{8}$ — $1\frac{1}{2}$  oz zinc-white or 1—3 lbs chalk per 10 gallons liquor. The goods, either previously dyed and slightly rinsed, or merely bleached, are worked for 5 to 10 minutes, whereupon the requisite quantity of dyestuff, well dissolved and filtered through cotton cloth, is added, the goods being then treated for about another  $\frac{1}{2}$  hour or until the desired shade has been obtained. Hereupon the goods are washed in the washing machine with a large quantity of water for a short time in order to remove the surplus zinc-white or chalk, and thus to avoid the inconvenient beating, and are finally whizzed, and dried in a frame at a moderate temperature.

For White, chalk and zinc-white are usually used together, the quantity being increased correspondingly.

## Production of Dischargeable Dyeings on Woollen and Worsted Piece-Goods.

*Discharging Agent.* Hyraldite CW extra and W have proved exceedingly useful as discharges for wool, both for white and for coloured discharges. For coloured discharges, tin crystals discharges are still used now and then, particularly for the blue and red discharge style.

*Preliminary Treatment of the Goods.* The pieces to commence with are singed and washed, and hereupon they are bleached and chlored as described in our "Manual of Dyeing", Vol. IV on Printing (No. 2941), pages 135—137.

In order to obtain white discharge effects, it is essential to use the whitest goods possible. On this account, it is advisable to remove the yellowish tone resulting from the chloring by treating the goods for 15 to 20 minutes in a cold bath charged with a small quantity of bisulphite (about 1 lb bisulphite 64° Tw per 10 gallons liquor). Hereafter the goods are rinsed, treated for a short time in a cold bath containing 1 gallon peroxide of hydrogen per 100 gallons liquid, and a small quantity of ammonia, rinsed again, and dyed.

### Easily Dischargeable Dyestuffs.

The dyestuffs enumerated below are all easily dischargeable with Hyraldite. Those marked with an asterisk (\*) may also be discharged with coloured discharges of tin crystals.

For producing dischargeable dyeings, Acid Colours come in the first place into consideration; for dyeings fast to washing and milling, *Diamine Colours* and some of the *Chrome Colours* may likewise be used.

The following dyestuffs are the most suitable for the purpose:

For Pink and Red:

- \*Lanafuchsine SG
- \*Brilliant Lanafuchsine GG, SL, BB
- \*Scarlet FR, F2R, F3R
- \*Brilliant Scarlet GG, G, R, RR, 3R
- \*Naphtol Red C

} Method a,  
page 142.



For shades very fast to washing:

*Diamine Rose GD, BD, FFB	}	Method c, page 143.
*Diamine Scarlet B, 3B		
*Diamine Red 4B		
*Diamine Fast Red F		

For Yellow and Orange:

*Acid Yellow AT	}	Method a, page 142.
*Fast Acid Yellow TL		
*Fast Yellow S		
*Orange GG, extra, II, R		

For shades very fast to washing:

*Milling Yellow O	}	Method b, page 143
*Diamine Yellow CP	}	Method c, page 143.
Diamine Orange F		
Oxy Diamine Orange G		
shaded with *Diamine Scarlet B		

For Brown:

Combinations of		
Tetra Cyanole extra	}	Method a, page 142.
*Azo Wool Blue C (for deep shades and for tin crystals discharge)		
*Acid Yellow AT		
*Lanafuchsine SG		

For shades very fast to washing:

*Diamine Brown M, R, S	}	Method c, page 143.
*Diamine Catechine G, 3G		
shaded with *Diamine Black DN		
Diamine Orange F Oxy Diamine Orange G		

or, combinations of

Anthracene Chrome Blue R	}	Method d, page 144.
Anthracene Yellow BN		
Anthracene Chrome Red A		

For Grey and Mode Shades:

Combinations of

Tetra Cyanole extra	}	Method a, page 142.
*Azo Wool Blue C (for tin crystals discharge)		
*Fast Acid Yellow TL		
*Acid Yellow AT		
*Orange GG		
*Lanafuchsine SG		

For shades very fast to washing:

Combinations of

*Diamine Black DN	}	Method c, page 143.
*Diamine Yellow CP		
*Diamine Catechine G, 3G		
*Diamine Brown M, R, S		
*Diamine Scarlet B		

or, of

Anthracene Chrome Blue R	}	Method d, page 144.
Anthracene Yellow BN		
Anthracene Chrome Red A		

For Violet and Claret:

*Acid Violet 4RS	}	Method a, page 142.
*Naphtol Red C		
*Azo Fast Violet 2R (for Violets very fast to light)		
*Azo Wool Violet 7R		
shaded with		
Tetra Cyanole extra		
*Orange GG		
*Acid Yellow AT		

For shades very fast to washing:

*Diamine Violet N.	}	Method c, page 143.
*Oxy Diamine Violet B, R, G		
*Diamine Fast Violet FFBN, FFRN		
*Diamine Bordeaux B		
*Diamine Brilliant Bordeaux R		
shaded with		
*Diamine Brilliant Blue G		
Oxy Diamine Orange G		

For Blue:

For light, bright Blues:

Cyanole extra, FF	}	Method a, page 142.
Tetra Cyanole V. extra		
*Azo Wool Blue C (chiefly for tin crystals discharge)		

For Navies and Dark Blues:

Discharge Blue BG extra	}	Method a, page 142.
shaded with		
Cyanole FF		
*Azo Fast Violet 2R		
*Acid Violet 4RS	}	Method b, page 143.
Discharge Blue B, G		
shaded as stated above		

For tin crystals discharge:

*Azo Wool Blue C	}	Method a, page 142.
shaded with		
*Acid Yellow AT		
*Orange GG, extra		
*Lanafuchsine SG		

For Blue on Gentlemen's Suitings the following dyestuffs are particularly well suited:

*Naphtol Blue G	}	Method b, page 143.
*Lanacyl Navy Blue B		
*Lanacyl Violet BF		
further:		
Anthracene Chrome Blue R	}	Method d, page 144.
shaded with		
Cyanole FF		
Tetra Cyanole extra, V		

For shades very fast to washing:

*Oxy Diamine Blue 5G, 3G, B	}	Method c, page 143.
*Diamine Sky Blue FF		
*Diamine Blue RW		
shaded with		
*Diamine Fast Violet FFBN		
*Oxy Diamine Violet B		
*Diamine Green CL		

For Green and Olive:

Combinations of

Tetra Cyanole extra	}	Method a, page 142.
*Azo Wool Blue C (for full shades and for tin crystals discharge)		
*Acid Yellow AT		
*Orange GG Acid Green extra conc. (for brightening)		

For shades very fast to washing:

*Diamine Green CL, B, G, FG	}	Method d, page 144.
*Diamine Dark Green N		
shaded with Oxy Diamine Orange G, R		
*Diamine Yellow CP		

For Black:

*Discharge Black BF extra	}	Method b, page 143.
*Naphtylamine Black EFF	}	Method a, page 142.

For shades very fast to washing:

*Diamine Black DN	}	Method c, page 143.
*Discharge Black N		

Dyeing Directions for Dischargeable Shades.

Method a.

Charge the dyebath with

10% Glauber's salt crystals  
5—10% bisulphate of soda (according to the  
depth of the shade

or

20% Glauber's salt crystals  
2—4% sulphuric acid 168° Tw.

along with the necessary quantity of dyestuff. Enter the goods at about 50° C. (120° F.), raise the temperature to the boil within 30 to 40 minutes, and work the goods for 1 hour at the boil. In the case of deeper shades, add some bisulphate or sulphuric acid subsequently if necessary, in order to effect a better exhaustion of the bath, and continue the boiling for another 20 to 30 minutes.

For subsequent shading, any readily dischargeable dyestuffs which may be dyed according to these directions may be used. The bath is cooled off to some extent, and subsequently heated again to the boil; the cooling off is of special importance in the case of Scarlet, Brilliant Scarlet, Naphtol Red and Naphtylamine Black.

#### Method b.

Charge the bath with

20% Glauber's salt crystals,  
5% acetic acid and the  
dyestuff,

Enter the goods lukewarm, raise the temperature to the boil within 30 to 40 minutes, and continue boiling for about  $\frac{3}{4}$  hour; exhaust the bath in the case of dyeing Discharge Blue B and G, by adding 10% bisulphate of soda in several portions and well diluted with cold water, or for Naphtol Blue G, Lanacyl Navy Blue B, Lanacyl Violet BF and Discharge Black BF extra, 3—5% acetic acid, well diluted with water, and after the last addition boil for about another  $\frac{1}{4}$  hour.

If only small quantities are required for subsequent shading, easily levelling dyestuffs such as the following are used:

Fast Acid Yellow TL	Cyanole extra, FF
Orange GG	Tetra Cyanole extra, V
Lanafuchsine SG	Azo Wool Blue C.

These dyestuffs may be added straightaway to the boiling bath. If however Milling Yellow, Discharge Blue, Naphtol Blue or Lanacyl Navy Blue are to be used for shading the bath should be cooled down to about 60° C. (140° F.) by adding cold water and then brought again gradually the boil.

#### Method c (for Diamine Colours).

Charge the dyebath with

10% Glauber's salt crystals and the  
dyestuff.

Enter the goods lukewarm, raise the temperature to the boil within  $\frac{3}{4}$  hour, and continue boiling for about an hour.

In case some dyestuff has to be added subsequently, the bath is cooled off slightly and then gradually brought again to the boil.

Method d (for Chrome Colours).

Mordant the goods, according to the depth of shade, in the customary manner with

1—4% bichrome

1—3% tartar

for 1½ hours at the boil, rinse, and dye in a fresh bath with the addition of

1—3% acetic acid or

5% acetate of ammonia (for very light shades).

Enter the goods at 40—50° C. (105—120° F.), raise the temperature to the boil within ½ hour, and continue boiling for 1½ to 2 hours. The bath may be exhausted by gradually adding a small quantity of acetic acid after boiling for 1 hour.

When dyeing in copper vessels, prepare the dyebath at about 40—50° C. (105—120° F.) with

½% ammonium sulphocyanide { of the weight of the goods,  
2% acetic acid

mix well, and allow to stand for 20 minutes before adding Glauber's salt, acid and dyestuff.

For subsequent shading, such easily levelling dyestuffs as the following are used to best advantage:

Fast Acid Yellow TL

Orange GG

Lanafuchsine SG

Cyanole extra, FF

Tetra Cyanole extra, V

Azo Wool Blue C,

which may be added direct to the boiling liquor.

For *discharging directions* see our "Manual of Dyeing", Vol. IV on Printing (No. 2941), pages 162—166.

## Dyeing of Woollen and Worsted Piece-Goods containing White Silk Shots.

For the production of clear silk effects, low acidity and a high temperature of the dyebath are essential. In order to have the temperature of the dyebath as high as possible, it is advisable to fix a second steam coil in the dye vat, preferably in the main part of the vat in which the goods are running.

### Dyeing of Ladies' Dress Goods.

See the subsequent chapter on the "Dyeing of Fabrics composed of Wool and Silk".

### Dyeing of Gentlemen's Suitings.

For compound shades and blues, *Acid* and *Chrome Colours* are used according to the requirements made for fastness; for *blacks*, the *Chrome Colours* come in the first place into consideration, more particularly *Chrome Black BG extra* and *B for Wool and Silk Goods*, and *Anthracene Acid Black ST*.

The following dyestuffs and their combinations are best suited for dyeing these goods:

### For Compound Shades (Grey, Mode, Brown and Olive):

#### Combinations of

Alizarine Cyanole EF	} dyed in an acid bath
Fast Acid Yellow TL	
Acid Yellow AT (as a heavy yellow)	
Brilliant Lanafuchsine SL	

Of eminent fastness to light, alkalies and perspiration:

#### Combinations of

Anthracene Chrome Blue F	} dyed on chromed goods
Anthracene Chromate Green B (for Olive)	
Anthracene Yellow BN	
Anthracene Chrome Red A	
Anthracene Chrome Violet B	
or, of	
Anthracene Chromate Grey G	} dyed according to the chromate process
Anthracene Chromate Green B (for Olive)	
Anthracene Yellow BN	
Anthracene Chrome Red G	
Anthracene Chromate Violet XR	

**For Navies and Dark Blues:**

Lanacyl Blue BN	}	died in an acid bath
Lanacyl Blue RN		
Dark Blue WS (for very deep Blues)		
shaded with		
Lanacyl Violet BF		
Orange GG		

Of eminent fastness to light, alkalies and perspiration:

Anthracene Chrome Blue F	}	died on chromed goods.
Anthracene Chrome Blue 2298J		
shaded with		
Anthracene Chrome Violet B		

**For Black:**

Chrome Black BG extra for Wool and Silk Goods	(particularly for bluish Blacks)
Chrome Black B for Wool and Silk Goods	
Anthracene Acid Black ST	
shaded with	
Anthracene Chrome Violet B	
Anthracene Yellow BN.	

*Directions for Dyeing Alizarine Cyanole Combinations:*

Dye with the addition of 10% Glauber's salt and 10—15% acetic acid 30% (depending on the depth of the shade) or 2—3% formic acid 85%; enter the goods straightaway into the boiling liquor, and boil as severely as possible for 1 to 1¼ hours. Hereafter rinse well, and sour off in the last rinsing bath with acetic or formic acid.

For subsequent shading in the boiling bath, the following dyestuffs will serve best:

Cyanole FF	Orange GG
Fast Acid Yellow TL	Lanafuchsine SG.

*Directions for Dyeing Lanacyl Blue and Dark Blue WS:*

Charge the dyebath with

10% acetate of ammonia,
5% acetic acid and
4—5% dyestuff,

enter the goods at the boil, and exhaust the bath after one hour's severe boiling by the gradual addition of 5—8% acetic acid. Then rinse, and acidify with acetic acid or formic acid.



For *subsequent shading*, the same dyestuffs are used to best advantage as are enumerated below sub "Directions for Dyeing Chrome Colours for Compound Shades".

*Directions for Dyeing Chrome Colours for Compound Shades.*

The dyeing is carried out according to Method XIII (on chromed goods) and XII B (according to the chromate process) on page 14 and 15, special attention being paid in this case also to a thorough boiling of the dyebath. After dyeing, the goods are acidified in the last rinsing bath with acetic or formic acid.

For subsequent shading, the following come in the first place into consideration:

Azo Wool Blue C	Fast Acid Yellow TL
Cyanole FF (in small quantities)	Orange GG
	Lanafuchsine SG

and may added to the boiling bath direct.

*Directions for Dyeing Anthracene Chrome Blue for Navies and Dark Blues.*

The goods are mordanted as customary with 3—4% bichrome and  $2\frac{1}{2}$ —3% tartar for  $1\frac{1}{2}$  hours at the boil, rinsed, and dyed in a fresh bath with the addition of 5% acetic acid. They are entered at about 80° C. (175° F.), the temperature being raised within 20 minutes to the boil; after boiling severely for 1 hour, 5—7% acetic acid or 1— $1\frac{1}{2}$ % formic acid 85% are added in several portions, and the goods are worked for another  $\frac{3}{4}$  hour in a strongly boiling bath, being finally rinsed well and brightened with acetic or formic acid.

For subsequent shading, the dyestuffs named above for shading chrome colours are to be recommended.

*Directions for Dyeing Chrome Black BG extra and B for Wool and Silk Goods.*

Charge the dyebath with

10% Glauber's salt crystals  
 2% formic acid 85% and  
 6— 8% dyestuff,

enter the goods at the boil, and after boiling for  $\frac{1}{2}$  hour, add 2.5—3% formic acid in two portions, the boiling being continued for about another  $\frac{3}{4}$  hour. Hereafter rinse the goods lightly, enter direct into a fresh bath charged with 3% bichrome and 2% formic acid, and after-treat for 1 hour at the boil; then rinse well, and acidify well with formic acid.

Although not completely exhausted the dyebath, like the chroming liquor, is not used for subsequent lots, the Black turning out more greenish in the standing bath. Instead of formic acid, sulphuric acid may be used (altogether about 4%), but it has to be considered that the silk does not remain as white in this case as when formic acid is used.

*Directions for Dyeing Anthracene Acid Black ST:*

Charge the dyebath with

10 % Glauber's salt crystals  
 $1\frac{1}{4}$  % formic acid 85% and  
 6—8 % Anthracene Acid Black ST,

enter the goods at the boil, and after severely boiling for  $\frac{3}{4}$  hour, add  $1\frac{1}{4}$  % formic acid 85%, the working being continued for another  $\frac{3}{4}$  hour in a severely boiling bath.

Hereafter rinse the material in cold water and bring into a fresh, boiling bath containing  $2\frac{1}{2}$  % formic acid 85% (of the weight of the goods), to which add 2% bichrome after boiling for  $\frac{1}{2}$  hour; then work for another  $\frac{1}{2}$  hour in a gently boiling bath.

Finally rinse, and acidify well with formic acid.

*Dyeing Subsequent Lots in the Standing Bath.* The dyebath is only partly exhausted and may consequently be used to good advantage for subsequent lots. For every following batch, add

3 % Glauber's salt crystals  
 3.5—4.5% Anthracene Acid Black ST.

Enter the goods into the boiling bath, and, after working for  $\frac{3}{4}$  hour in a severely boiling liquor, add  $1\frac{1}{4}$  % formic acid 85% the boiling being continued for another  $\frac{3}{4}$  hour.

Finally rinse, and aftertreat in the manner stated for the first lot.

### Clearing the Silk.

The silk, if not found sufficiently clear, is in some cases cleared by a subsequent treatment. For this purpose a bath is charged with 1 quart acetate of ammonia for 100 gallons liquor, the goods being treated herein for 20 to 30 minutes. Anthracene Colours are stripped at the boil, Acid Colours at a temperature of 70—80° C. (160—175° F.) Then the goods are rinsed and acidified with acetic or formic acid.

The shades produced on the wool with Acid Colours are rendered slightly lighter by this treatment, which fact has to be taken into consideration when dyeing.

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## DYEING OF PIECE-GOODS CONTAINING ARTIFICIAL SILK.

In order to obtain fine, lustrous goods, it is essential in the first place to use artificial silk possessing a very high lustre, careful treatment of the material during all the different processes and speedy completion of the goods in dyeing being some other main points for obtaining good results. For such articles, Viscose silk has proved excellent, as this kind of artificial silk resists the dyeing and finishing of these goods very well.

### A. Production of Dyeings Containing White Artificial Silk Effects.

For obtaining pure white effects, a large number of easily levelling dyestuffs comes into consideration. Such dyestuffs which are suited for this purpose as well as combinations of same are enumerated in the tables on pages 108—120. For *the black and white style*, *Naphtylamine Black EFF*, shaded to demand with *Naphtol Red C* or *Orange GG*, is especially well suited.

The dyeing is carried out in the manner customary for easily levelling dyestuffs, in a boiling bath, with the addition of

10% Glauber's salt crystals,  
10% bisulphate, and to advantage subsequently  
2% monosolvol

or

20% Glauber's salt crystals,  
4% sulphuric acid and  
2% monosolvol.

In some dye-houses formic acid is given the preference, and 4% formic acid 85% along with Glauber's salt and monosolvol are used for the purpose. In order to obtain clear artificial silk effects, the dyebaths must be thoroughly exhausted, and on this account, especially in the case of full shades, some bisulphate of soda or acid may have to be added subsequently.

After dyeing, rinse the goods well, gum if necessary with gelatine or tragacanth, and dry, to best advantage on a tentering frame.

## B. PRODUCTION OF PLAIN SHADES.

Light shades and black are best dyed according to the one-bath method, medium and dark shades in two baths by previously dyeing the wool in an acid bath with easily levelling dyestuffs, and dyeing the artificial silk subsequently in a cold bath with Diamine Colours.

### Production of Light Shades (One-Bath Method):

The dyestuffs and their combinations coming into consideration are the same as for dyeing union goods, as given in Section C (Dyeing of Union Goods); owing to the greater affinity of the artificial silk, however, these fabrics demand generally a larger quantity of wool dyestuff.

For light shades, the following dyestuff are especially well suited:

#### *Acid Colours.*

Indian Yellow G, FF, R	Brilliant Milling Blue B
Orange extra	Tetra Cyanole A
Azo Red A	Alizarine Cyanole EF
Rosazeïne B	Brilliant Milling Green B
Alizarine Cyanole Violet R	Alizarine Brilliant Green G
Formyl Violet, all brands	Naphtol Blue Black.

*Diamine Colours:*

Thioflavine S	Diamine Fast Bordeaux 6BS
Diamine Fast Yellow,	Diamine Fast Red 8BL
all brands except 3G	Diamine Fast Violet
Diamine Orange B	FFBN, FFRN
Diamine Fast Orange	Diamine Sky Blue, FF
EG, ER	Diamine Fast Blue FFG, FFB
Diamine Fast Brown	Diamine Fast Brilliant Blue
GB, G, R	R
Diamine Brown 3G, M	Diamine Brilliant Blue G
Diamine Rose, all brands	Diaminogene extra.

*Method of Dyeing:*

Dye with the addition of

5—10% Glauber's salt crystals

1% acetic acid

2% monosolvol;

enter the goods lukewarm, heat within  $\frac{1}{2}$  hour to 70—80° C (160—175° F.), and dye at this temperature for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour. For subsequently shading the wool, add some wool dyestuff, whereas for subsequently shading the artificial silk cool the bath down till lukewarm, then add the necessary Diamine Colour, and continue the dyeing for some time. After dyeing, rinse well, and acidify with acetic acid.

Production of Black (One-Bath Method).

For Black, Alphanol Black in combination with Diamine Fast Black and Diamine Green has proved especially well suited.

Charge the dyebath containing about 35 to 40 times the amount of liquor of the weight of the dyestuff, for instance as follows:

For Blue Black:

5—6 % Alphanol Black KBB	} calculated on the weight of the goods
0.75% Diamine Fast Black XN extra conc.	
1% Diamine Green CL	

For Jet Black:

5 —6 % Alphanol Black KV	} calculated on the weight of the goods
1 % Diamine Fast Black XN extra conc.	
1.25—1.5% Diamine Green CL	

and further with

1½ lbs Glauber's salt crystals	} per 10 gallons liquor.
1½—3 oz monosolvol	

Enter the goods at 60° C. (140° F.), raise the temperature within 20 to 30 minutes to the boil, boil gently for 1 hour, rinse well, and finally acidify feebly with acetic acid.

The dyebath is not thoroughly exhausted and is preserved to advantage for dyeing subsequent lots.

### Production of Medium and Dark Shades

#### (Two-Bath Method).

*Dyeing of the Wool:* Dye the wool with the easily levelling dyestuffs enumerated in the tables on pages 108—120, in an acid bath, and with the same additions as indicated above for the production of dyeings containing white, artificial silk shots.

*Subsequent Dyeing of the Artificial Silk:* For this purpose the same Diamine Colours come into consideration as recommended in Section C (Dyeing of Union Goods) for subsequent dyeing of the cotton in union goods. Work the previously acid-dyed and well rinsed goods for ½ to 1 hour in a short, cold bath containing:

3/8—3/4 oz soda ash	} per 10 gallons liquor, (depending upon the depth of shade)
1 —1½ lbs Glauber's salt crystals	
1½—3 oz monosolvol	

in addition to the necessary quantity of dyestuff, rinse thoroughly, and finally acidify feebly with acetic acid.

The baths for subsequent dyeing are not completely exhausted and are consequently preserved for subsequent lots.

DYEING OF MILITARY AND OTHER  
UNIFORM CLOTHS.

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## DYEING OF MILITARY AND OTHER UNIFORM CLOTHS.

Military and other uniform cloths are mostly dyed in the loose wool, such dyestuffs coming first into consideration as are distinguished for particularly good properties of fastness, i. e. to milling, light, steaming and carbonising.

Cloths for facings on the other hand are as a rule dyed in the piece; in addition to good penetration and best possible fastness to light, they must also possess good fastness to water and alkalies.

Military cloths, and also many sorts of cloths for public officials, are produced by way of mixtures, because these combine a pleasing appearance with the advantage of being less affected by dirt. For military cloths, the growing tendency to adapt the shade of the cloths as far as possible to surroundings, i. e. to make it as invisible as possible for long ranges, has likewise to be taken into consideration. Instead of the formerly customary full and more or less bright colours, comparatively light, but dull shades are nowadays given the preference, these being obtained by mixing light to medium grey, green, brown or khaki-coloured wools with white wool. It stands to reason that such light mixtures do not possess the same good fastness to light as the dark shades used formerly. This drawback however is compensated by our process of producing mixtures fast to light, which is founded on the application of wool dyed a light shade with metal salts instead of using white wool. The application of this light-coloured mixing wool which is easily dyed with metallic salts, invariably the same shade, and which possesses a perfect fastness, has rendered it possible to diminish the weight of the wool of the ground shades, while dyeing it a considerably deeper shade, whereby the fastness to light is increased exceedingly. The mixtures produced according to our process, besides possessing great fastness to light, show the advantage of being less impaired by dirt and of having a superior fastness to wear compared to the mixtures produced with white wool; on this account the process has already been taken up by several Governments for producing military cloths, and we have taken out

patents for it in most industrial countries. British Patent No. 12831/07.

In the production of mixing wool, soft water free from lime has proved the most favourable; the wool to be dyed should moreover as far as possible be free from alkalies.

For mixing, especially two shades come into consideration:

*A. Greenish Mixing Wool:*

Charge the dyebath with

3% bichrome  
6% lactic acid 50%  
1% sulphuric acid;

enter the scoured wool at about 70° C. (160° F.), raise the temperature to the boil, and boil for about  $\frac{3}{4}$  hour; when the wool, at first coloured yellowish, has turned greenish, and the liquor has become perfectly clear, throw the wool out of the bath, rinse, and dry. Prolonged boiling is not necessary. If after boiling for  $\frac{3}{4}$  hour the greenish tone should not yet be attained, add 1% sulphuric acid, and boil for about another 10 to 15 minutes.

*B. Drab Mixing Wool.*

Dye the scoured wool with

3% bichrome  
0.5% sulphate of copper  
6% lactic acid 50%  
1% sulphuric acid,

as stated sub A.; when the bath is exhausted, cool down, add

2% hyposulphite of soda,  
and boil for another  $\frac{1}{2}$  hour; then rinse, and dry.

**"Field Grey".**

Military cloths known as "Field Grey" are continually gaining in importance nowadays, as the armies in all the different countries are introducing campaigning uniforms which are as inconspicuous as possible and for this purpose "Field Grey" mixtures are especially well suited. The dull "Field Grey" shade offers the additional great advantage of being little affected by dust or dirt.

The "*Field Grey*" of the German Army is produced according to the following directions, mixing wool dyed a greenish shade which possesses excellent fastness to light being used for the purpose.

"*Field Grey*" for German Army Trouserings: The wool is vat-dyed with Indigo to a blue the shade of the cornflower, and dyed with

2.8 %	Anthracene Chrome Brown SWN	} according to the after-chroming process. Method XI, page 13.
0.25 %	Anthracene Yellow GG	
1.75 %	bichrome	
50 parts of this dyeing are mixed with		
50 parts of greenish mixing wool (page 156).		

"*Field Grey*" for German Army Tunics. The wool is vat-dyed with Indigo a shade somewhat lighter than that for trouserings, and dyed with

3 %	Anthracene Chrome Brown SWN	} according to the after-chroming process. Method XI, page 13.
0.2 %	Anthracene Yellow GG	
<hr/> 1.75 %	bichrome	
50 parts of this dyeing are mixed with		
50 parts of greenish mixing wool (page 156).		

Up to the present, "Field Grey" was produced in the following manner:

"*Field Grey*" for German Army Trouserings (older process). Wool is vat-dyed with Indigo to a blue the shade of the cornflower and dyed with

1 %	Anthracene Chrome Brown D	} according to the after-chroming process. Method X, page 12.
0.35 %	Anthracene Acid Brown G	
0.08 %	Anthracene Yellow C	
1 %	bichrome	
60 parts of this dyeing are mixed with		
40 parts raw white wool.		

"*Field Grey*" for German Army Tunics (older method): The wool is dyed with Indigo a slightly lighter Blue than that for trouserings, and is dyed with

0.74 %	Anthracene Chrome Brown D	} according to the after-chroming process. Method X, page 12.
0.08 %	Anthracene Acid Brown G	
0.1 %	Anthracene Yellow C	
1 %	bichrome	
65 parts of this dyeing are mixed with		
35 parts of raw white wool.		

## Khaki.

In some countries Khaki shades have assume similarly great importance for military purposes owing to their being not very visible in the field. Khaki is sometimes produced as a solid shade, usually however as a mixture.

The mixture is produced partly by mixing one shade only with white, partly also by mixing two, three or more different shades with white, a pale yellow-brown, a gold, a dark brown as well as blue shades serving in the first instance as ground colours.

The *British Khaki for blouses and tunics*, for instance, is produced with a gold, a brown and a pale blue mixed with white, as follows:

53 parts gold	4.5 parts light blue
17 parts brown	25.5 parts white.

The shades are produced on white wool, according to the after-chroming process, with the following quantities of dyestuffs:

## A. Gold:

0.4 % Anthracene Chrome Brown D	} Method X, page 12
0.3 % Anthracene Chrome Blue F	
1 % Anthracene Yellow C	
1 % bichrome	

## B. Brown:

2.1 % Anthracene Chrome Brown D	} Method X, page 12
1.25 % Anthracene Chrome Blue F	
1.8 % Anthracene Yellow C	
3 % bichrome	

## C. Light Blue:

1 % Anthracene Chrome Blue F	} Method XI, page
0.75 % bichrome	

*In the same manner as described above for "Field Grey" shades of khaki of considerably superior fastness to light may be produced by using mixing wool dyed a drab shade with metallic salts instead of white mixing wool.*

In order, for instance, to produce British Khaki for blouses or tunics with very much better fastness to light, the gold and brown should be dyed considerably darker, the drab-coloured mixing wool described on page 156 being used in place of white wool in order to attain the shade of the mixture in question.

Khaki shades are dyed according to the after-chroming process as follows:

A. Dark Gold:

0.6 %	Anthracene Chrome Brown D	} Method X, page 12
0.5 %	Anthracene Chrome Blue F	
2 %	Anthracene Yellow C	
2 %	bichrome	

B. Dark Brown:

4.5 %	Anthracene Chrome Brown D	} Method X, page 12
1.3 %	Anthracene Chrome Blue F	
2.25 %	Anthracene Yellow C	
3 %	bichrome	

C. Light Blue:

1 %	Anthracene Chrome Blue F	} Method XI, page 13
0.75 %	bichrome	

The following are the proportions for producing the mixture fast to light:

43 parts	Dark Gold
10 „	Dark Brown
5 „	Light Blue
42 „	Drab-coloured mixture wool (page 156).

A *Khaki for Colonial Troops* of eminent fastness to light is dyed according to the after-chroming process in the following manner:

A. Gold:

3 %	Anthracene Yellow C	}
0.7 %	Anthracene Blue Black BE	
2.25 %	bichrome	

B. Brown:

5 %	Anthracene Chrome Brown SWN	} Method X, page 12
2.5 %	Anthracene Yellow C	
3 %	bichrome	

C. Olive:

3 %	Anthracene Blue Black BE	}
1 %	Alizarine Brilliant Green G	
2.5 %	Anthracene Yellow C	
3 %	bichrome	

the mixture shade being obtained by mixing in the following proportions:

18	parts of	Gold	
7	„	Brown	
20	„	Olive	
55	„	Drab-coloured mixture wool	
(for method of production see page 156).			

The *Khaki for the Turkish Army* is produced in the following manner:

The loose wool is dyed according to the after-chroming process with

0.08%	Anthracene Chromate Brown EB	} Method X, page 12,
0.32%	Anthracene Yellow C	
0.58%	Anthracene Blue Black BE	
0.6 %	bichrome	

the prescribed mixture shade being attained by mixing  
95 parts of this dyeing and  
5 „ of grey wool.

*Khaki for the Servian Army* is produced in the following manner:

Dye according to the after-chroming process:

A. Light Yellow:

0.2 %	Anthracene Yellow C	} Method X page 12
0.002%	Alizarine Brilliant Green G	
0.25 %	bichrome	

B. Red:

0.75	Anthracene Chrome Red G	} Method X page 12
0.9 %	bichrome	

C. Drab:

0.73 %	Anthracene Chrome Brown SWN	} Method X page 12
0.1 %	Anthracene Yellow C	
0.2 %	Anthracene Blue Black BE	
0.55 %	bichrome	

D. Light Blue is dyed with Indigo in the vat.

The mixture shade is obtained by mixing in the following proportions:

27	parts	A (Light Yellow)
14	„	B (Red)
23	„	C (Drab)
36	„	D (Light Blue).

*Uniform shades for Khaki* are dyed on loose wool with combinations of

Anthracene Chrome Brown SWN, D	} according to the after-chroming process, Methods X and XI, pages 12 and 13
Anthracene Chrome Red A	
Anthracene Yellow C, BN, GG	
Anthracene Blue Black BE, C, KG	
Anthracene Chrome Blue F	

or of

Anthracene Chromate Brown EB	} according to the after-chroming process, Method XII, page 14.
Anthracene Yellow C, BN, GG	
Anthracene Chromate Grey KB, G	

The new *Russian military cloth*, presenting a light shade between Grey and Khaki, is dyed either in the loose wool or in the piece with

0.18% Anthracene Chromate Brown EB	} according to the after-chroming process, Method X, page 12.
0.25% Anthracene Blue Black C	
0.10% Anthracene Yellow C	
0.25% bichrome	

### Khaki Dyed in the Piece.

Khaki is dyed in the piece preferably with combinations of the following dyestuffs:

Anthracene Chrome Brown SWN, D	} according to the after-chroming process, Method X, page 12, or on chromed wool, Method XIII, page 15
Anthracene Yellow BN, GG	
Anthracene Chrome Red A	
shaded with	
Anthracene Chrome Blue F or Anthracene Blue Black C, BE	

or with

Anthracene Chromate Brown EB	} according to the after-chroming process, Method XII, p. 14.
Anthracene Yellow BN, GG	
Anthracene Chromate Grey KB, G	

Occasionally Diamine Colours are used for khaki shades on piece-goods, principally the following:

Diamine Fast Red F	} with the addition of Glauber's salt, Method XIV, page 17.
Diamine Fast Yellow FF	
Diamine Fast Blue G	

### Black Dyed in the Loose Wool.

The Black required for the production of Marengo, greyish black, and black and blue mixture cloths (for instance, for German Army trouserings as used formerly, overcoats for the Austrian Infantry, Turkish Military Cloth, greyish cloth for traffic officials, policemen etc. is dyed in the loose wool with

Anthracene Chrome Black	PPN extra	} according to the after-chroming process, Method X, page 12.
	PPC extra	
	PPS extra	
	PPT extra	
	5B	
	F	
	FE	
or else with		
Anthracene Acid Black	DSF	
	DSN	
	DNG	
for bluer Blacks and Marengo with		
Anthracene Chrome Black	PBB	
Anthracene Blue Black	BE	

For overcoatings for the Austrian Infantry and for German post-office officials the requisite Black is dyed with

6—6.5 % Anthracene Chrome Black	F	} Method X, page 12
2—2.5 % bichrome		

for *Greyish Cloth for the Turkish Army* with

5% Anthracene Chrome Black	} Method X, page 12
PPT extra	
2% bichrome	

for *Cloth for German Railway Officials:*

a) For trousers for summer wear with

6.75% Anthracene Chrome Black	} Method X, page 12
PPN extra	
0.15% Anthracene Yellow C	
2.25% bichrome,	

b) for trouserings II and for overcoatings with

7—7.5 % Anthracene Chrome Black	} Method X, page 12
PPS extra	
1—2.25% Anthracene Chrome Black	
2.75—3 % bichrome	



### Black Dyed in the Piece.

a) For cloths dyed to very fast colours, the same dyestuffs as mentioned before for loose wool are used, being applied according to the same method and dyed both on white goods and on material which has been previously vat-dyed in the loose state with Indigo Blue MLB.

The afore-mentioned dyestuffs offer the advantage of excellent penetration, and the goods dyed in the piece, like those dyed in the wool, possess excellent fastness to light.

*Diagonal Cloths for Railway Officials* are dyed with

6	%	Anthracene Chrome Black PPS extra	} Method X, page 12.
2.5	%	" " " 5B	
2.75	%	bichrome	

b) *Cloth for Facings* and other cloths to be produced with good fastness to light are dyed with

Naphtyl Blue Black N according to Method VI, page 10,  
or with

Alphanol Black KV, KBB, according to Method V, page 8,  
or again with

Naphtylamine Black S	} according Method II, page 5.
" " T	
" " TN	
Naphtylamine Blue Black B	
" " " 5B	
Naphtol Black B	}
" " 2B	

Only in fastness to milling and potting these colours are inferior to those produced as described under (a); in all such cases, however, where these properties of fastness are not essential, they are used quite generally on account of their eminent fastness to light.

### Blue Dyed in the Loose Wool.

Blue is dyed on loose wool both for solid shades and for blue mixture shades (grey, etc.) for military and other uniform cloths, the wool being for such purpose sometimes dyed with Anthracene Colours direct and at others vat-dyed previously with Indigo MLB and then dyed with the dyestuffs mentioned.

The dyestuffs coming into consideration for this purpose are:

Anthracene Chrome Blue	F	} according to the after-chroming process, Methods X and XI, pages 12 and 13
	FR	
	BB	
	G	
	R	
Anthracene Acid Blue	EB	
	ER	
	KBR	

or else

Anthracene Chrome Blue	BW extra	} on chromed wool according to Method XIII, page 15. In the case of particularly deep Blues produced on chromed wool it is advisable to after-chrome lightly in order to obtain the best possible fastness to mil-ling and alkalies.
	RRW extra	
	R	
	G	
	BB	

further:

Alphanol Blue, all brands	} Method VII, page 10.
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For *bluish-grey mixture shades*, the greenish mixing-wool dyed according to our process has proved very useful. The well-known mixtures for German army overcoatings, Swedish and Austrian army cloth are obtained in very much better fastness to wear and less sensitiveness to soiling than with white mixing wool.

A mixture corresponding to the *Swedish military cloth*, and resembling the German cloth, for overcoats, is obtained by mixing

35 parts of a wool dyed with

3 %	Anthracene Chrome Blue R	} according to the after-chroming process, Method X, page 12
4 %	Anthracene Acid Blue ER	
3 %	bichrome	

with 65 parts greenish mixing-wool (page 156),

or with a wool dyed on a cornflower blue Indigo ground with

2.5 %	Anthracene Chrome Blue F	} according to the after-chroming process, Method X, page 12
3 %	Anthracene Acid Blue R	
3 %	bichrome	

35 parts of which are mixed with 65 parts of green mixing-wool.

Mixtures closely approaching the *Austrian bluish grey* army cloth are obtained by dyeing on a cornflower blue blue Indigo bottom with

4.5 % Anthracene Blue Black BE	} according to the after-chroming pro- cess, Method X, p. 12
2.25 % bichrome	

and mixing the dyed wool with the same quantity of greenish mixing wool (page 156).

### Blue Dyed in the Piece.

For dark blues dyed in the piece, the same dyestuffs are used as for blue on loose wool, the method of dyeing also being the same.

In addition to these, the following dyestuffs come into consideration for piece-dyeing:

Anthracene Chrome Blue RST	} dyed on chromed goods, according to Method XIII, page 15
" " " BST	
" " " "	

which dyestuffs are distinguished for their excellent solubility and good levelling properties.

The pieces intended for blue are frequently also bottomed first with Indigo, mostly in the loose wool, the goods being then topped or saddened in the piece with the afore-mentioned products.

For *Dark Blue Riding Breeches*,

Naphtyl Blue Black N	} dyed according to Method VI, page 9
shaded with	
Alphanol Blue BR extra	

is also used.

### Light Blue for Facings and Head-Gear.

Light, brilliant blues for facings are produced either with acid colours eminently fast to light and easily levelling such for instance as:

Alizarine Cyanole B	} according to Method I, page 4
" " EF	
Alizarine Cyanole Violet R	
shaded with	
Orange GG	
Fast Acid Yellow 3G	

or else with

Alkaline Blue 6B—3R according to Method VIII, page 11.

In order to increase the fastness to water, it is advisable to subsequently treat the dyed goods with tannic acid according to the directions given on page 127.

## Green, Dark Green, Bluish Green and Dark Olive Dyed in the Loose Wool.

Green, dark green and bluish green military and other uniform cloths such as are worn by the German custom-house officials, constabulary and foresters, are dyed almost without exception in the loose wool, and the same is the case with dyestuffs requisite for all "field green" military cloths (mixture cloths), the following dyestuffs being used for the purpose:

Anthracene Chrome Blue G, BB, F	} according to the after-chroming process, Method X and XI, pages 12 and 13
Anthracene Blue Black BE	
Anthracene Chromate Green KFF extra	
Anthracene Yellow C, BN, GG	
Alizarine Brilliant Green G, SE	
Anthracene Chrome Brown D shaded with	
Anthracene Chrome Black 5B, PPC extra, PBB	
Anthracene Acid Black DSF, DSN	

The green, dark green and bluish green shades are frequently produced on wool dyed in the Indigo vat, by topping such wool with

Milling Yellow O	} dyed in an acid bath according to Method III, page 6
Alizarine Prilliant Green G	

or with

Anthracene Yellow C, BN, GG	} according to the after-chroming process, Method X, page 12
Anthracene Chrome Blue G, F	
Anthracene Blue Black BE	
Anthracene Chromate Green KFF extra	
Alizarine Brilliant Green G	
Anthracene Chrome Black 5B	

or again with

Anthracene Yellow C, BN, GG	} according to the after-chroming process, Method XII, page 14.
Anthracene Chromate Green B, KFF extra	
Alizarine Brilliant Green G, SE	
Anthracene Chromate Blue XR	

For brightening green shades, Brilliant Milling Green B or Tetra Cyanole A are used.

*Dark Green Uniform cloths for custom-house officials* are dyed in the loose wool with

2.65 %	Anthracene Chrome Blue F	} according to the after-chroming process, Method X, page 12
1.4 %	Alizarine Brilliant Green G	
0.95 %	Anthracene Yellow C	
3 %	bichrome	

*Cloth for the German constabulary* is dyed in the loose wool with

3 %	Anthracene Chrome Blue F	} according to the after- chroming process Method X, page 12.
1.8 %	Alizarine Brilliant Green G	
1.6 %	Anthracene Chrome Black PBB	
0.4 %	Anthracene Yellow C	
3 %	bichrome	

A great variety of greenish mixtures is produced on a green bottom. The wool for

*German greenish-grey military cloth* for instance is dyed on a cornflower blue Indigo bottom with

0.3 %	Anthracene Yellow C	} Method X, page 12
0.02 %	Anthracene Chrome Brown D	
0.25 %	bichrome	

for coatings and with

0.22 %	Anthracene Yellow C	} Method X, page 12
0.06 %	Anthracene Chrome Brown D	
0.25 %	bichrome	

for trouserings.

The mixtures are obtained by mixing 50 parts dyed wool with 50 parts white wool.

The same mixture shades can be obtained in considerably better fastness to light by dyeing the ground shades on the same Indigo bottom as mentioned above, with

0.55 %	Anthracene Chrome Blue F	} Method X, page 12
0.5 %	Alizarine Brilliant Green G	
0.26 %	Anthracene Yellow GG	
0.7 %	bichrome	

for coatings,

and with

0.65 %	Anthracene Chrome Blue F	} Method X, page 12
0.4 %	Alizarine Brilliant Green G	
0.22 %	Anthracene Yellow GG	
0.7 %	bichrome	

for trouserings.

50 parts of these ground shades are mixed with 50 parts greenish mixing wool (page 156).

*Italian Field Green* is dyed on a dark Indigo bottom with

1.15 %	Anthracene Yellow C	} Method X, page 12
0.3 %	Anthracene Chrome Brown D	
0.9 %	bichrome	

for coatings, and with

1.2 %	Anthracene Yellow C	} Method X, page 12
0.5 %	Anthracene Chrome Brown D	
1 %	bichrome.	

for trouserings.

The mixtures are produced by mixing 52 parts dyed wool with 48 parts white wool.

The same mixture shades may be obtained considerably faster to light and wear by dyeing the ground shades on the same Indigo bottom and mixing them with greenish mixing wool.

The ground shades in this case are produced as follows:

1.1 %	Anthracene Yellow C	} Method X, page 12
1.5 %	Anthracene Chrome Brown D	
1.5 %	bichrome	

for coatings,

0.9 %	Anthracene Yellow C	} Method X, page 12
1.35 %	Anthracene Chrome Brown D	
1.25 %	bichrome	

for trouserings,

the mixture shades being obtained by mixing 45 parts dyed wool with 55 parts greenish mixing wool (page 156).

*Norwegian field green cloth* is obtained by mixing wool dyed on a cornflower-blue Indigo bottom with

2.6 %	Anthracene Chromate Green B	} according to the chromate process, Method XII, page 14
0.8 %	Anthracene Yellow C	
0.4 %	Anthracene Chromate Brown EB	
1.9 %	bichrome,	

with green mixing wool (page 156), the proportions being: 60 parts dyed wool and 40 parts green mixing wool.

*Swiss Green* is obtained in best possible fastness by dyeing with

4.5 %	Anthracene Chromate Green	} according to the chromate process, Method XII, page 14
	KFF extra	
1.85 %	Anthracene Chromate Blue XR	
0.15 %	Anthracene Yellow GG	
2.5 %	bichrome	

and mixing 50 parts of the dyeing obtained with 50 parts green mixing wool (page 156).

*Roumania* has likewise introduced a green mixture shade for military cloths, of which the ground shade is dyed with

0.55 %	Anthracene Chrome Blue F	} according to the after-chroming process, Method X, page 12,
0.45 %	Alizarine Brilliant Green G	
0.12 %	Anthracene Yellow GG	
0.8 %	bichrome	

50 parts dyed wool being mixed with 50 parts raw white wool.

For a considerably more yellowish, duller mixture in the same proportions, the ground shade is produced with

0.4 %	Anthracene Chrome Blue F	} according to the after-chroming process, Method X, page 12.
0.4 %	Alizarine Brilliant Green G	
0.4 %	Anthracene Yellow GG	
0.8 %	bichrome	

The same mixture shades can be obtained with much better fastness to light and wear with greenish mixing

wool, for which purpose the ground shades are produced according to the after-chroming process with

0.8 %	Anthracene Chrome Blue F	} Method X, page 12
0.8 %	Alizarine Brilliant Green G	
0.05 %	Anthracene Yellow GG	
0.2 %	Tetra Cyanole A	
1.2 %	bichrome	

or with

0.6 %	Anthracene Chrome Blue F	} Method X, page 12
0.65 %	Alizarine Brilliant Green G	
0.5 %	Anthracene Yellow GG	
1.2 %	bichrome	

In order to obtain the mixture shade, 40 parts dyed wool are mixed with 60 parts green mixing wool (page 156).

### Dark Green, Blue Green and Dark Olive Dyed in the Piece.

The dyestuffs indicated for loose wool are applied in the same manner as for piece-goods, except that Anthracene Yellow BN is used instead of C.

For cloths dyed in the piece, too, the loose wool is frequently bottomed with Indigo, the goods, after the weaving and milling, being topped in the piece with Milling Yellow O, Anthracene Yellow BN, Alizarine Brilliant Green G, SE, Anthracene Chromate Green KFF extra, or with Anthracene Chrome Blue G, F, and Anthracene Yellow BN, as described above.

On the other hand, greens are frequently also dyed in the piece on a chrome mordant.

The following may be dyed on chromed goods:

Combinations of

Anthracene Chrome Blue BW extra, G  
 Anthracene Yellow BN  
 Anthracene Blue Black BE  
 Alizarine Brilliant Green SE, G;

and for shading, the following products are used:

Brilliant Milling Green B  
 Cyanole Fast Green G  
 Tetra Cyanole V, A.



*Bavarian Cavalry Coatings and Trouserings.* The cloth used for these purposes is dyed in the piece on a cornflower-blue Indigo bottom. The loose wool is vat-dyed with Indigo, the goods being then dyed in the piece with

0.85 % Anthracene Chrome Blue G	} on a chrome mordant, Method XIII, page 15.
1.6 % Anthracene Yellow BN	
0.8 % Cyanole Fast Green G	

### Green Facings.

For cloths used for green facings, the following dyestuffs come into consideration:

Cyanole Fast Green G	} dyed in an acid bath according to Method I, or III, pages 4 and 6.
Alizarine Brilliant Green G	
shaded with	
Milling Yellow O	
Fast Acid Yellow 3G, TL	
Acid Yellow AT	
China Yellow B	
Tetra Cyanole V	

It is well to treat the dyed goods in accordance with the method given on page 127, in order to increase the fastness to water.

### Brown Dyed in the Loose Wool.

Brown is dyed in the loose wool both for the production of plain brown shades and various mixture shades, the following dyestuffs being suited for the purpose:

Anthracene Chrome Brown A, D, DWN, SWN, SWR	} according to the after-chroming process, Methods X and XI, pages 12 and 13
Anthracene Chromate Brown EB	
Anthracene Blue Black BE	
Anthracene Chrome Blue F, BB, G. R	
Anthracene Yellow C, GG, BN	
Anthracene Chrome Red A	

or

Anthracene Chromate Brown EB, ER	} according to the chromate process, Method XII, page 14.
Anthracene Yellow C, GG, BN	
Anthracene Chromate Blue XR	
Anthracene Chromate Grey G, KB	

*The brown cloth for the Austrian Artillery* (for coatings and overcoatings), is dyed in the loose wool with

7% Anthracene Chrome Brown A	} according to the after-chroming process, Method X, page 12.
3% bichrome	

### Brown Dyed in the Piece.

The same dyestuffs are used as for loose wool, the following being best suited for the purpose on account of their good penetrating property:

Anthracene Chrome Brown D, SWN	} according to the after-chroming process, Methods X and XI pages 12 and 13.
Anthracene Blue Black BE	
Anthracene Chrome Blue F, BB, G, R	
Anthracene Yellow BN	
Anthracene Chrome Red A	

### Brown Facings.

In addition to the above-named Anthracene Colours, easily levelling acid dyestuffs come chiefly into consideration such as

Brilliant Lanafuchsine GG, BB	} dyed in an acid bath, Method I, page 4.
Orange GG, extra	
Fast Acid Yellow TL, 3G	
Acid Yellow AT	
Alizarine Cyanole EF, SR	

### Madder Shades Dyed in the Loose Wool.

The following are used for madder shades:

Diamine Fast Red F	} according to the after-chroming process, and fixed with chromium fluoride or bichrome, Method XIV, page 17.
shaded with	
Anthracene Yellow C	
Anthracene Blue Black BE, C	

The dyeings produced with Diamine Fast Red F are distinguished over all other madder shades by their eminent fastness to alkalis and carbonising, as well as by the considerably simpler method of their production and the better milling properties of the dyed wool.

*Cloth for the Austrian Cavalry Trouserings and Head-gear* is dyed in the loose wool with

2.2 %	Diamine Fast Red F	} dyed and after-chromed, Method XIV, page 17.
0.75 %	Anthracene Yellow C	
0.05 %	Anthracene Blue Black BE	
$\frac{3}{\%}$	chromium fluoride	

### Madder Shades Dyed in the Piece.

The same dyestuffs are used for piece-goods as for loose wool; for shading towards yellow, however, Anthracene Yellow BN is usually given the preference.

### Red Facings.

For red facings the following dyestuffs are used:

Scarlet FR, F2R, F3R	} dyed in an acid bath Methods I and II, pages 4 and 5.
Brilliant Cochineal 2R, 4R	
Brilliant Scarlet 2R, 4R	
Crystal Scarlet 6R	
Brilliant Lanafuchsine GG, BB shaded with	
Fast Acid Yellow TL	
Orange GG, extra	} dyed according to Method XIV, page 17.
Rosazeine B	
Diamine Scarlet B, 3B	
Diamine Fast Red F shaded with	
Milling Yellow O	
Diamine Bordeaux B	

Furthermore, as a substitute for cochineal a combination of

Brilliant Cochineal or Scarlet with Natural Cochineal is used for red facings.

This combination offers against natural cochineal dyeings or combinations of cochineal with flavine the advantage of superior fastness to alkalies and light, better levelling and penetrating properties, as well as facilities in case of any shading being necessary.

The dyestuffs coming in the first instance into consideration for such combinations are:

Brilliant Cochineal 2R, 4R  
Scarlet FR, F2R, F3R  
Brilliant Scarlet R, 2R, GG

which may be applied either alone or in combination with each other according to the shade to be produced. For very yellow shades of scarlet, Orange R or Acid Yellow AT may be used for shading, for bluish shades of red, Rosazeine B.

The goods, which should be well scoured and if necessary also bleached, are first boiled for  $\frac{1}{2}$  hour with

2% oxalic acid and

4% sulphuric acid

and then rinsed lightly.

A fresh, short bath is then prepared with, say,

4—6% cochineal (previously ground and tied up in a linen bag),

4% tartar and

2—3% tin crystals,

and boiled for 10 minutes, when cold water, and finally a solution of about

1% Brilliant Cochineal 2R and

1% Scarlet F2R

are added.

The goods are entered into this bath at about 50° C. (120° F.) which is raised in  $\frac{1}{2}$ — $\frac{3}{4}$  hour to boiling temperature; after about  $\frac{1}{4}$  hour's boiling or so the cochineal is removed, whereupon the goods are boiled for another 30—40 minutes and finally rinsed very thoroughly in soft water.

The previous boiling of the goods with oxalic acid and sulphuric acid may be dispensed with, in which case

4—6% cochineal (ground and tied up in a linen bag) are first boiled for 10 minutes in the dyebath; then

3.5 % oxalic acid

0.75% tartaric acid

2—3 % tin crystals

are added to the bath.

After this, cold water is added to cool the bath to 50—60° C. (120—140° F.), and finally the solution of the requisite dyestuff. Enter the clean and moistened goods into the thus prepared bath, raise the temperature in about 25 to 30 minutes to the boil, and work boiling for 35 to 40 minutes, then shade if necessary, or rinse.

Somewhat brighter and more yellowish shades are obtained by using  $\frac{1}{2}$ —1% of the so-called "Scarlet Composition" either straightaway in the dyeing or by adding the same subsequently. This composition is produced by gradually dissolving 1 part of granulated tin in 4 parts of hydrochloric acid and 2 parts of nitric acid, care being taken to keep the solution cool. It is best to allow the solution to stand for a day or two before use.

For the production of bright shades, prolonged boiling should be avoided, but another main condition is that pure water entirely free from iron should be employed. In order to remove impurities, the water used for dyeing is frequently boiled with a little stannous chloride, or first of all with bran; or, a clean cloth intended to be dyed a dark shade is allowed to run for 15—20 minutes at the boil in the water employed for the scarlet dyeings.

It is best to use vats of wood, tin or tin-plated copper for dyeing; in order to avoid spots copper, brass and iron parts should be avoided or at least tin-plated.

The goods should be clean and as white as possible; very yellowish cloth is bleached before the dyeing with hydrogen or sodium peroxide. (For bleaching directions see page 51.)

Hot drying and pressing renders the shade of cochineal dull and bluish; the cloth is therefore dried at 30—40° C. (85—105° F.) and given only a moderately hot pressing.

### Red Fezzes.

This headgear, as worn in the Orient and by some Colonial regiments is dyed with

Diamine Fast Red F	} dyed and afterchromed: Method XIV, page 17
shaded with	
Diamine Brilliant Bordeaux R	
Diamine Fast Yellow FF	
Alizarine Cyanole EF	

or with

Diamine Scarlet B, 3B	} dyed as per Method XIV, page 17
Diamine Red KF	

or with

Wool Red B	} acid-dyed according to Method III, page 6
Milling Red FR	

or, if in the first place very high requirements only for fastness to light are made, with

Brilliant Croceïne 3B	}	died in an acid bath, Method II, page 5.
Brilliant Cochineal 2R, 4R		
Scarlet FR—F3R		

The *four red shades on fezzes introduced in the Turkish Army* are dyed with

3.5 %	Diamine Fast Red F	} dyed and after- chromed, Method XIV, page 17.
0.5 %	Diamine Brilliant Bordeaux R	
1 %	bichrome	
2.6 %	Diamine Fast Red F	
1.3 %	Diamine Brilliant Bordeaux R	
1.5 %	bichrome	
1.6 %	Diamine Fast Red F	
2 %	Diamine Brilliant Bordeaux R	
0.2 %	Alizarine Cyanole EF	
1.5 %	bichrome	
2.4 %	Diamine Fast Red F	
2.2 %	Diamine Brilliant Bordeaux R	
0.65 %	Alizarine Cyanole EF	
1.5 %	bichrome	

The *fezzes of the German East African Colonial regi-  
ments* are dyed with

3.8 %	Diamine Fast Red F	} dyed and after- chromed, Method XIV, page 17.
1.6 %	Diamine Brilliant Bordeaux R	
0.1 %	Diamine Fast Yellow FF	
2 %	bichrome	
2 %	Diamine Fast Red F	
0.2 %	Diamine Brilliant Bordeaux R	
1 %	bichrome	

### Crimson Facings.

For the dyeing of crimson facings, the following dyestuffs are very well suited:

Brilliant Lanafuchsine BB	}	acid-dyed, Methods I or II, pages 4 and 5.
Lanafuchsine 6B		
Croceïne AZ		
Brilliant Croceïne 7B		
"      "      9B		
shaded with		
Alizarine Cyanole Violet R	}	
Azo Wool Violet 7R		
Rosazeïne B		

### Violet Facings

are mostly dyed with

Acid Violet 6BS	}	acid-dyed, Methods I or II, pages 4 and 5.
shaded with		
Alizarine Cyanole Violet R		
Azo Wool Violet 7R, 4B		
Lanafuchsine 6B		

In some special cases,

Methyl Violet R—6B dyed as per Method XV, page 18 are used for violet facings.

### Orange and Yellow Facings.

The following dyestuffs are used for this purpose:

*For Yellow:*

Milling Yellow O, G, acid-dyed, Method III, page 6;

further:

Acid Yellow AT	}	acid-dyed, Method I, page 4
Fast Acid Yellow 3G, TL		
China Yellow B		
Fast Yellow S		

or

Diamine Fast Yellow 3G	}	dyed according to Method XIV, page 17.
Diamine Fast Yellow FF		

*For Orange:*

Milling O by itself	}	dyed acid or neutral according to Methods III or XIV, pages 6 and 17
or shaded with		
Diamine Scarlet B		

or

Orange GG, EN, ENZ, extra	}	acid-dyed, Method I, page 4.
shaded with		
Rosazeïne B		

### Grey and Drab-Coloured Facings

are produced with a combination of

Alizarine Cyanole EF	}	acid-dyed, Method I, page 4.
Fast Acid Yellow TL		
Brilliant Lanafuchsine GG		



DYEING OF WOOL AND FUR FELT HATS.

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## DYEING OF WOOL AND FUR FELT HATS.

Hats are dyed either ready-milled, in the form of soft or stiff hat bodies, or in the half-milled state as shapes or as settled felt.

Wooden vats with a false bottom or copper kettles are used as dye vessels; the latter may be heated either with direct or indirect steam, or by a fire underneath the kettle. The system of paddle wheels has proved of excellent value; by means of the revolution of the wheel, the working by hand of the hats in the dye vessel may be dispensed with. More recently the dyeing machines of Mehler and Rey have been adopted in the hat industry, because they effect a saving in manual labour and leave the material in its original quality.

Before dyeing, the hats, shapes or felts must be wetted out well in hot water.

If the material contains a large amount of acid, some ammonia, carbonate of soda or borax is frequently added to the wetting bath, or the goods are boiled for 15 to 20 minutes in water, and rinsed again if necessary in fresh water. Soap-milled wool felts should likewise be thoroughly wetted out before dyeing; if they contain any soap residue, they should be wetted out with the addition of some ammonia, and finally rinsed in fresh water.

Any fat or oil retained from the spinning or from an insufficient washing of the wool must be absolutely removed before treating the goods with acid in the settling, milling or carbonising of the felt, as such residues would otherwise cause spots on the hat bodies and a mixtury appearance on the brims.

The following groups of dyestuffs are used for dyeing:

1. Acid Colours,
2. Chrome Colours (Anthracene Chrome, Anthracene Chromate and Anthracene Acid Colours),
3. Diamine Colours.

On account of their simple method of application and excellent penetrating properties, the *Acid Colours* occupy the first position in hat dyeing. They are not only of primary importance for the dyeing of ladies' and children's hats, but are also used generally for dyeing black and coloured hats for gentlemen's wear.

In point of fastness, dyeings done with Acid Colours as a rule satisfy all normal requirements. If the demands in respect to fastness are especially high, the *Alizarine Cyanole brands* in combination with Acid Colours of good fastness to light, such as *Fast Acid Yellow* and *Brilliant Lanafuchsine*, are given the preference.

*Anthracene Chrome*, *Anthracene Chromate* and *Anthracene Acid Colours* are used if along with a very good fastness to light especially good fastness to alkalies (alkaline rinsing) is required (i. e. for stiff hats which are to be dyed in a soft condition and subsequently stiffened), or if a very high degree of fastness to acids is necessary (for completing the milling of the half-milled felts in a fresh sulphuric acid bath). Chrome Colours are also of importance for the dyeing of stiffened hat bodies.

*Diamine Colours* serve for the production of Reds fast to light, perspiration, water and alkalies, especially for fez caps.

### Dyeing Directions for Fancy Shades.

#### I. Dyeing Directions for Acid Colours on Soft or Stiff Wool and Fur Felt Hats and Shapes.

Prepare the bath with

10—20% Glauber's salt crystals and the requisite dyestuff; enter the wetted out, and if necessary previously neutralised, material at 40—60° C. (105—140° F.); raise in  $\frac{1}{2}$  hour to the boil, and boil for 30 to 40 minutes until the goods are sufficiently penetrated, or, in the case of hard-milled hat bodies, for  $1\frac{1}{2}$  to 2 hours. Hereafter add, whilst turning the felts inside out, 1—4% sulphuric acid or the corresponding quantity of bisulphate of soda in one or two portions to the bath, and boil until the latter is completely exhausted, which will be the case after 20 to 30 minutes.

When dyeing hat bodies heavily milled and hard to penetrate, it is advantageous to add, after the penetration of the goods, 5—10% acetic acid, and in case of need a small quantity of sulphuric acid (1—2%) well diluted, and to boil the goods for  $\frac{3}{4}$  to 1 hour.

*Soap-milled hats* may be entered at once into the dyebath charged with

10—20% Glauber's salt crystals and

1—2 % sulphuric acid,

and are then dyed as described above.

For *stiff hats*, add the requisite quantity of acid (2—4% sulphuric acid or 5—10% bisulphate of soda) at the commencement of the dyeing, and reduce that of Glauber's salt to about 5%.

*Half-milled felts* may also be dyed direct with the whole of the requisite quantity of acid, provided they do not contain too much acid already.

The boiling should be reduced to the shortest time possible.

## II. Dyeing Directions for Alkaline Blue and Alkaline Violet on Soft Wool Felts.

First boil the hats (according to the quantity of acid they contain) with

5—10% borax,

so that the bath shows a slight alkaline reaction to the last, and likewise the wet felt when cut.

Then cool off the bath, add the requisite quantity of dyestuff, dye for about  $\frac{3}{4}$  hour at the simmer, rinse thoroughly, and develop for 20 to 30 minutes in a fresh bath heated to about 50° C. (120° F.) with the addition of

4—5% sulphuric acid.

For *soap-milled hats*, charge the bath with

3—5% borax and the dyestuff.

enter the well wetted goods at about 60° C. (140° F.), raise in 20 minutes to the boil, and continue as above stated.

Copper vessels should be avoided, because copper dulls the shades.

## III. Dyeing Directions for Anthracene Chrome, Anthracene Chromate and Anthracene Acid Colours on Soft or Stiff Wool and Fur Felt Hats and Shapes.

The after-chroming process serves principally for dyeing wool and fur felt shapes or settled felts.

Ready-milled and stiffened hats are mostly dyed according to the two-bath method, although good results may likewise be obtained by the after-chroming process. Besides for fur felt, the chromate process has proved of advantage also for the dyeing of thin fur felt hats which are stiffened after the dyeing.

### *After-chroming Process.*

Charge the bath with

1—3% sulphuric acid (according to the depth of the shade to be dyed and the acid still contained in the goods) and the requisite dyestuff,

or, for *thicker shapes* and *hat bodies* with

5—10% Glauber's salt,  
1—3 % sulphuric and  
the requisite dyestuff.

Enter the well wetted or boiled felts at 40—50° C. (105—120° F.), raise in  $\frac{1}{2}$  to  $\frac{3}{4}$  hour to the boil, and dye at the boil for  $\frac{1}{2}$  to 1 hour. Hereupon cool the bath down to 60—70° C. (140—160° F.), add the corresponding quantity of bichrome (abt. one-third of the quantity of dyestuff, and for half-milled felt, even in the case of deep shades not more than 1.5%), raise again gradually to the boil, and finally boil for another  $\frac{1}{2}$  hour.

When dyeing felts containing acid with *Anthracene Blue Black C*, *BE*, *Anthracene Chrome Brown DWN*, *Anthracene Chromate Brown WS*, *WG*, *EB*, *Alizarine Brilliant Green G*, *SE* and *Anthracene Acid Blue ER* and *EB*, commence dyeing with the addition only of 5—10% Glauber's salt, adding 1—2% sulphuric acid in case of need after boiling for 30 minutes. Felts which have been milled alkaline or have been neutralised are dyed with the addition of 5—10% Glauber's salt and 2—3% acetic acid, 1—3% sulphuric acid being added subsequently after boiling for 30 minutes. In both cases the goods are chromed according to the method stated above.

*Felts containing a large quantity of acid, as for instance carbonised felts*, are to advantage neutralised, before dyeing, by adding a small quantity of ammonia, borax or soda to the wetting bath.

When dyeing *fully milled hat bodies*, enter them turned inside out into the dyebath. Before chroming, the bodies are turned round again, and are entered into the chroming bath.

In the case of *shapes*, only part planked felts need be turned inside out.

With regard to subsequent shading, and to the dyeing in copper vessels, see page 16, or pages 12 and 13 respectively.

#### b) *Dyeing of Chromed Goods:*

Mordant the felts for 1 to  $1\frac{1}{2}$  hours at the boil with  
2 —4% bichrome and  
 $1\frac{1}{2}$ —3% tartar,

rinse, and dye in a fresh bath.

Enter the goods lukewarm into the dyebath, raise gradually to the boil, and boil for 1 to  $1\frac{1}{2}$  hours; for deep

shades add abt. 3% acetic acid in order to effect a complete exhaustion of the dyebath.

Instead of tartar, other mordants may be used as substitutes therefor. For particulars of the subsequent shading and the dyeing in copper vessels, see pages 16 and 15 respectively.

### c) *Chromate Process.*

Dissolve the dyestuff in hot water, and add the solution to the dyebath. Boil up the bath, cool down, add the stated quantity of bichrome, and enter the goods at 50—70° C. (120—160° F.). Treat the felts for 15 to 20 minutes at this temperature, and after raising to the boil, dye gently boiling for 1¼ to 1½ hours. In the case of light and medium shades, the dyebath is sufficiently exhausted; when dyeing deep shades, gradually add to advantage 1—3% acetic acid, well diluted, to the dyebath after boiling for 1 hour.

*Acid-milled or carbonised felts* should be neutralised before dyeing by boiling in water or by adding if necessary a small quantity of borax or ammonia.

With regard to subsequent shading, see page 16.

## IV. Dyeing Directions for Diamine Colours (chiefly Red for Fez Caps).

Charge the bath with

10—20% Glauber's salt crystals,  
5% acetate of ammonia\*

and the requisite dyestuff.

Enter the neutralised or wetted goods at 50° C. (120° F.), gradually raise the temperature to the boil, and boil for 1 to 1½ hours; if necessary, exhaust the bath by an addition of 2—5% acetic acid. If the goods are to be after-chromed, add to the exhausted bath 1—2% bichrome or 2—3% chromium fluoride, and again boil for 30 minutes. If the chroming is carried out in a fresh bath, 2—3% acetic acid should first be added to the same.

If the goods are thoroughly rinsed in running water after the milling, it is unnecessary to neutralise with alkalis.

\* For the preparation of ammonium acetate see appendix.

## Dyeing Directions for Black.

### I. Dyeing Directions for Acid Black on Soft Wool and Fur Felt Hats.

Prepare the bath with

5—15% Glauber's salt crystals and the requisite dyestuff, enter the well wetted or boiled goods at 60° C. (140° F.), raise in 20 to 30 minutes to the boil, and boil until the goods are completely penetrated for about  $\frac{3}{4}$  to 1½ hours. For the better exhaustion of the bath add 1—5% sulphuric acid or the corresponding quantity of bisulphate of soda in two portions.

In the case of *soap-milled hats*, start dyeing with the addition of

10% Glauber's salt crystals and

5% acetic acid or 1—1½% sulphuric acid, otherwise working as indicated above.

For *Alphanol Black dyeings on gentlemen's wool hats* which are subjected to a more severe decatising, it is advisable to aftertreat the dyed hats in the exhausted bath without steam for 20 minutes with 3% copper sulphate in order to improve their fastness to steaming.

### II. Dyeing Directions for Acid Black on Stiff Wool and Fur Felt Hats.

Charge the bath with

1—2% sulphuric acid and the requisite dyestuff.

Enter the wetted hat bodies at 70° C. (160° F.), raise at once to the boil, boil gently for  $\frac{1}{2}$  hour, and then exhaust the bath by adding

2—4% sulphuric acid, well diluted with water, in two portions.

### III. Dyeing Directions for Hat Chrome Black, Anthracene Chrome Black and Anthracene Acid Black.

For *soft hats*, charge the dye bath with

5—15% Glauber's salt crystals and the requisite dyestuff, enter the previously wetted hat bodies at 50—60° C. (120—140° F.), raise in 20 to 30 minutes to the boil, and boil for  $\frac{3}{4}$  to 1 hour, until the hats are dyed through; for *wool hats* add then 3—4%, and for felt hats 4—6% sulphuric acid in several portions, and boil after the last addition for another 20 minutes.



Hereafter chrome in a fresh liquor with the addition of

2—2½ % bichrome  
2 % hydrochloric acid

for 30 to 40 minutes at the simmer. A rinsing of the hat bodies before chroming is not necessary.

For *soap-milled wool felts*, simultaneously add besides 10% Glauber's salt

3—5% acetic acid

to the dyebath, and then dye in the same manner as stated above.

For Anthracene Chrome Black F, FE or combinations of these brands, the bath should be corrected first by adding 3—6 lbs oxalate of ammonia per 100 gallous liquor, according to the hardness of the water, stirring well and then adding dyestuff, Glauber's salt and acid.

In the case of *stiffened hats*, commence dyeing at once at a temperature of 70—80° C. (160—175° F.) without any Glauber's salt, with the addition of 1—2% sulphuric acid or 5—10% bisulphate of soda or 5% acetic acid, raise at once to the boil, and after ½ hour's gentle boiling add 2—4% sulphuric acid, well diluted with cold water, in two portions, and chrome after ½ hour's boiling in the manner indicated.

#### IV. Dyeing Directions for Naphtyl Blue Black in Combination with Logwood.

Mordant the bodies with

3% bichrome  
2% copper sulphate  
2% oxalic acid,

gently boiling for 1 to 1¼ hours, rinse lightly, and dye in a fresh bath with

5—6% Naphtyl Blue Black N  
½ % Indian Yellow G  
5—8% solid logwood extract  
1—2% oxalic acid (according to the hardness of the water).

Enter the mordanted bodies at abt. 80° C. (175° F.), raise at once to the boil, and dye at the simmer for abt. 1¼ hours.

# DYESTUFFS FOR GREY, MODE AND GREY, BEIGE, DRAB, BEAVER, NUTRIA,

## On Wool and Fur Felt Shapes, Soft and Stiff

### Acid Colours

I. Of normal Fastness to Light and  
very good Fastness to Steaming:

a) For light shades, easily  
levelling:

Cyanole Green B  
Tetra Cyanole V\*  
Cyanole extra, FF  
Blue PC (No 9623)  
Fast Yellow S  
Fast Acid Yellow 3G\*

\*Orange GG

Azo Orseille BB

b) For medium and deep shades,  
well levelling:

Cyanole Green B, 6G  
Tetra Cyanole V\*  
Blue PC (No 9623)  
Cyanole extra  
Fast Yellow S  
Acid Yellow AT\*  
Indian Yellow G\*, R, FF  
Tropaeoline OO, O  
Orange II, extra, IV  
Lanafuchsine SG, SB

II. Of very good Fastness to Light  
and good Fastness to Steaming:

Alizarine Cyanole EF\* (for light  
shades)

Alizarine Cyanole SB, SR, SG  
(for deep shades)

Fast Acid Yellow TL\*

Fast Acid Yellow 3G\* (for light  
shades)

Brilliant Lanafuchsine GG\*, BB\*,  
Alizarine Cyanole Violet R. [SL

For subsequent shading in the  
boiling dyebath, the dyestuffs  
mentioned under (a) are best suited.

Dyeing directions on page 182.

The dyestuffs marked with an  
asterisk (\*) are of very good fast-  
ness to hot pressing.

### Chrome Colours

Of very good Fastness to Milling  
and Light, and of good Fastness to

Alkaline Rinsing and Steaming:

a) After-chromed Colours,  
chiefly for Wool and Fur Felt Shapes.

Anthracene Blue Black C, BE  
Anthracene Chrome Blue G, F  
Anthracene Yellow BN, RN  
Milling Yellow O  
Anthracene Chrome Red A  
Anthracene Chrome Brown  
D, DWN  
Anthracene Chromate Brown  
WS, WG, EB.

Dyeing directions on page 183.

b) Dyeings on Chromed Goods.  
chiefly for wholly milled, soft and  
stiff wool and fur felt hats.

Anthracene Blue Black C  
Anthracene Chrome Blue G  
Anthracene Yellow BN, RN  
Anthracene Chrome Red A  
Anthracene Chrome Brown  
SWN, D  
Anthracene Chromate Brown  
WS, WG, EB.

Dyeing directions on page 184.

# BROWN SHADES ON HAT FELT

HAVANA, TOBACCO, COFFEE etc.

## Wool and Fur Felt Hats

### Chromate Colours

Of very good Fastness to Milling  
and Light, and of good Fastness to  
Alkaline Rinsing and Steaming:

Chiefly for half-milled fur felt  
shapes and for fur hats which are  
wholly stiffened after dyeing:

Anthracene Blue Black C  
Chromate Blue Black B  
Anthracene Yellow BN, RN  
Milling Yellow O  
Anthracene Chromate Brown  
WS, WG, EB  
Anthracene Acid Brown R.

Dyeing directions on page 185.

## On Wool and Fur Felt Shapes to be acid-milled

For this purpose, all the dye-  
stuffs enumerated on this and the  
opposite page are adapted.

For completing the milling of  
the shapes dyed with Acid Colours  
it is best to use the old dye-liquor.

Particularly Fast to Acid Milling  
are the following:

Milling Yellow O  
Anthracene Chrome Brown  
DWN  
Anthracene Chromate Brown  
EB, WS, WG  
Anthracene Blue Black C, BE  
Anthracene Chrome Blue G, F

Light Milling Colours suitable for  
dyeing Shapes and Settled Felts in  
combination with Graphite, Ochre etc.

For Silver and Pale Grey:  
Alizarine Cyanole EF, SB.  
SR, SG  
Alizarine Cyanole Violet R  
Formyl Violet S4B—10B  
Brilliant Milling Blue B  
or  
Anthracene Blue Black C  
Anthracene Chrome Blue G  
shaded with  
Formyl Violet S4B  
Brilliant Milling Blue B.

For Pale Beige, Pale Drab etc.  
Tetra Cyanole V  
Alizarine Cyanole EF, SB, SR  
Fast Acid Yellow TL  
Fast Yellow S  
Orange GG  
Azo Orseille BB  
Brilliant Lanafuchsine BB  
or  
the Chrome Colours in the two  
opposite columns.

## On Wool and Fur Felt Shapes, Soft and Stiff

### Acid Colours

#### a) Of normal Fastness to Light and good Fastness to Steaming:

Cyanole Green B, 6G  
 Naphtol Dark Green G  
 Blue PC (No 9623)  
 \*Tetra Cyanole V  
 Indian Yellow G\*, FF  
 \*Acid Yellow AT  
 Fast Yellow S  
 Tropaeoline OO, O  
 Orange IV, II, extra  
 Lanafuchsine SG  
 Azo Orseille BB, BE  
 \*Azo Wool Blue SE  
     (for saddening)

#### For Bright Greens:

\*Acid Green extra conc., B, 5G  
 Fast Acid Green BN  
 \*Tetra Cyanole V  
     shaded with  
     \*Naphtol Yellow S  
     Orange extra.

#### b) Of very good Fastness to Light and good Fastness to Steaming:

Cyanole Fast Green G  
     combined with  
 \*Fast Acid Yellow TL, 3G  
     (for pale shades)  
 \*Acid Yellow AT  
 \*Orange GG  
 Brilliant Lanafuchsine GG\*,  
     BB\*, SL

#### c) Of eminent Fastness to Light and good Fastness to Steaming:

Alizarine Brilliant Green G  
 Naphtol Green B  
     shaded with  
     Fast Acid Yellow TL, 3G  
     Acid Yellow AT (for full shades)  
     Orange GG  
     Brilliant Lanafuchsine GG, BB,  
     Cyanole Fast Green G [SL  
     Alizarine Cyanole EF, SB, SR,  
     SG.  
 Severe steaming renders Naphtol  
 Green B more brownish.

Dyeing directions on page 182.

For subsequent shading in a boiling bath, the following dyestuffs are best suited:

Tetra Cyanole V  
 Cyanole extra  
 Fast Yellow S

Fast Acid Yellow 3G  
 Orange GG  
 Azo Orseille BB.

The dyestuffs marked with an asterisk (\*) possess very good fastness to hot pressing.

# OLIVE ON HAT FELT

## Wool and Fur Felt Hats

### Chrome Colours

after-chromed or previously mordanted with chrome.

Of very good Fastness to Milling and Light, and of good Fastness to

Alkaline Rinsing and Steaming:

Anthracene Chrome Blue G  
Anthracene Blue Black C  
Alizarine Brilliant Green

G, SE

Anthracene Yellow BN, RN  
Anthracene Acid Brown G  
Anthracene Chrome Red A  
Anthracene Chrome Brown  
D, SWN, DWN  
Anthracene Chromate Brown  
EB, WG, WS

brightened with

Brilliant Milling Green B  
Tetra Cyanole A  
Cyanole Fast Green G.

For dyeings to be after-chromed,

Milling Yellow

is likewise frequently used.

Dyeing directions on pages 183 and 184.

## On Wool and Fur Felt Shapes to be acid-milled

For this purpose all the dye-stuffs enumerated on this and the opposite page are adapted.

For completing the milling of the shapes dyed with Acid Colours, it is best to use the old dye-liquor.

Particularly Fast to Acid Milling are the following:

Anthracene Chrome Blue G  
Anthracene Blue Black C  
Alizarine Brilliant Green  
G, SE

Milling Yellow O  
Anthracene Chrome Red A  
Anthracene Chrome Brown  
DWN  
Anthracene Chromate Brown  
EB, WS, WG.

# DYESTUFFS FOR YELLOW, ORANGE, PINK, RED,

## On Wool and Fur Felt Shapes,

### Yellow and Orange.

#### Of particular Brightness:

- \*Naphol Yellow S
- \*China Yellow B
- For Orange:
- \*Naphtol Yellow S
- combined with
- Rosazeïne B

#### Of normal Fastness to Light:

- Fast Yellow S
- \*Acid Yellow AT
- Indian Yellow FF, R, G\*
- Tropaeoline OO, O, G
- Orange IV, II, extra, R

#### Of very good Fastness to Light:

- \*Fast Acid Yellow TL
- \*Fast Acid Yellow 3G
- (for very pale Yellows)
- \*Acid Yellow AT (for full
- Yellows)
- \*Orange GG.

### Pink.

- Rosazeïne B
- Lanafuchsine SG, SB
- Brilliant Lanafuchsine GG\*,
- BB\*, SL.

Dyeing directions on page 182.

All the above dyestuffs yield dyeings of good fastness to steaming.

### Red, Claret and Prune.

- Scarlet, all brands
- Brilliant Scarlet \*GG, 2R,
- 4R, 6R
- Crystal Scarlet 6R
- Roccelline
- Amaranth
- Naphtol Red EB, C
- Azo Rubine A\*
- Brilliant Cochineal 2R, 4R
- Lanafuchsine SG, SB, 6B
- Brilliant Lanafuchsine GG\*,
- BB\*, SL.

For Claret and Prune, the above dyestuffs shaded with

- Cyanole extra, Tetra Cyanol V\*,
- \*Azo Wool Violet 7R, 4B

are used.

Or, in case of high requirements for fastness to light:

- Brilliant Lanafuchsine GG\*,
- BB\*, SL

shaded with

- Alizarine Cyanole EF\*, SR,
- SB, SG
- Alizarine Cyanole Violet R
- Azo Fast Violet 2R.

Dyeing directions on page 182.

All the above dyestuffs yield dyeings of good fastness to steaming.

The dyestuffs marked with an asterisk (\*)

For shapes which are to be ready-milled with acid,

For completing the milling of shapes dyed with Acid Colours

# CLARET, PRUNE AND VIOLET ON HAT FELT.

Caps, and Wool and Fur Felt Fezzes.

## Violet.

For very bright Shades:

Acid Violet 6BS, 6BC\*, 4RS  
Formyl Violet S4B,  
4BF—10B\*.

For deeper Violets:

\*Azo Wool Violet 7R, 4B.

For Violet Shades very fast  
to Light:

Alizarine Cyanole Violet R  
Azo Fast Violet 2R.

Dyeing directions on page 182.

For dark Violets on Wool and Fur  
Felt Hats, showing special fastness  
to Alkalies:

Anthracene Chrome Violet B  
after-chromed or dyed on a chrome  
mordant.

Dyeing directions on page 183.

All these dyestuffs except Acid  
Violet 4RS yield dyeings of very  
good fastness to steaming.

possess very good fastness to hot pressing.

the dyestuffs mentioned are all suited.

it is best to use the old dyeliquor.

## Red Fezzes.

Of normal Fastness:

Scarlet, all brands  
Brilliant Scarlet GG\*, 2R,  
4R, 6R

Crystal Scarlet 6R  
Roccelline, Amaranth  
Naphtol Red EB, C  
Azo Rubine A\*  
Brilliant Cochineal 2R, 4R  
Lanafuchsine SG, SB, 6B  
Brilliant Lanafuchsine GG\*,  
BB\*, SL,

for dark shades saddened with  
Cyanole extra, Tetracyanole V,  
Azo Wool Violet 7R, 4B.

Dyeing directions on page 182.

b) Of particularly good Fastness to  
Perspiration, Water and Alkalies,  
and good Fastness to Light:

\*Diamine Scarlet B, 3B

\*Diamine Red KF

\*Diamine Fast Red F.

The following dyestuffs are  
suited for shading:

\*Diamine Violet N

\*Diamine Fast Violet BBN  
Diamine Brilliant Bordeaux R

\*Diamine Fast Yellow FF

\*Diamine Yellow CP.

Dyeing directions on page 183.

All the above dyestuffs yield  
dyeings of good fastness to  
steaming.

## On Wool and Fur Felt Shapes, Soft and Stiffened

### Acid Colours

a) Of normal Fastness to Light  
and good Fastness to Steaming:

For bright Blues:

Cyanole FF, extra, AB  
\*Tetra Cyanole V, SF, extra  
Indigo Blue N  
Acid Violet 6BS  
\*Brilliant Milling Blue B.

For Navies and Dark Blues:

Azo Wool Blue SE\*, SER  
Azo Navy Blue B\*, 3B  
Acid Navy Blue A, KP  
Brilliant Naphtol Blue 4B,  
B, R  
\*Azo Wool Violet 4B, 7R  
Acid Violet 6BS.

Dyeing directions on page 182.

b) Of better Fastness to Light and  
good Fastness to Steaming:

For bright Blues:

Alkaline Blue, all brands  
shaded with  
Alkaline Violet CA, C.

Dyeing directions on page 183.

For Navies and Dark Blues:

\*Azo Fast Blue B, BD,  
BR conc.  
Fast Navy Blue B, G  
\*Azo Wool Violet 4B, 7R.

c) Of excellent Fastness to Light and  
good Fastness to Steaming:

For bright Blues:

Alizarine Cyanole EF\*, SB,  
SR, SG  
Alizarine Cyanole Violet R.

For dark Blue:

Peri Wool Blue B, BG, G.

Severe steaming renders the  
shade of Peri Wool Blue B and BG  
somewhat redder.

Dyeing directions on page 182.

The following products are suited for subsequent shading in a  
boiling bath:

Cyanole, all brands  
\*Tetra Cyanole, all brands  
Acid Violet 6BS

\*Orange GG  
\*Fast Acid Yellow 3G, TL  
Azo Orseille BB.

The dyestuffs marked with an asterisk (\*) possess very good fastness  
to hot pressing.



# SHADES ON HAT FELT.

## Wool and Fur Hats

### Chrome Colours

Of very good Fastness to Milling  
and Light, and of good Fastness to  
Alkaline Rinsing and Steaming:

a) After-Chromed Colours,  
chiefly for wool and fur shapes.  
Anthracene Acid Blue EB, ER  
Anthracene Chrome Blue  
F, FR, BB, R

saddened with

Anthracene Blue Black C, BE  
or brightened with

Brilliant Milling Blue B  
Formyl Violet S4B—10B  
Tetra Cyanole A.

Dyeing directions on page 183.

b) Dyeings on a Chrome Mordant,  
chiefly for ready-milled, soft and  
stiffened wool and fur hats.

Anthracene Chrome Blue  
BW extra, RRW extra, G,  
BB, R  
Anthracene Acid Blue EB,  
ER, RR  
Anthracene Blue Black BE.

Dyeing directions on page 184.

## On Wool and Fur Felt Shapes to be acid-milled

For this purpose all the dye-  
stuffs stated in the opposite  
columns may be used.

For completing the milling of  
the shapes dyed with Acid Colours  
it is best to use the old dye-liquor.

Particularly Fast to Acid Milling  
are the following:

Anthracene Chrome Blue F  
Anthracene Blue Black C, BE.

**Blacks of Normal Fastness to Steaming and Light; Fast to Alkaline Brim-Stiffening**  
(for Soft Fur and Wool Bodies).

**Black of Very Good Fastness to Steaming and Light; Fast to Alkaline Brim-Stiffening**  
(for Soft Fur and Wool Bodies).

For Blue-Black:

Naphtylamine Black 6B  
Hat Black 3BV.

For Jet Black:

Naphtylamine Black 4B  
Hat Black BB  
Hat Black HTV extra,  
HTB extra.

For covered cheap Blacks:

Hat Black KAP  
Naphtylamine Black X2B,  
X3B, OO.

Besides Hat Black the following combination is much favoured for hair bodies:

Naphtylamine Black 4B  
Naphtol Blue Black  
and a small quantity of  
Indian Yellow G.

*Blacks Fast to Alkalies, particularly well suited for alkaline Brim-Stiffening:*

Alphanol Black 3BN, BG, R  
Hat Fast Black ST  
Hat Black KT.

Dyeing directions on page 186.

For Blue-Black:

Naphtylamine Black 7BS  
Hat Black FC, F, 5BV

Excellently Fast to Steaming:

Naphtylamine Black ES3B  
Naphtylamine Black ES5B  
Naphtylamine Blue Black 5B.

For Jet Black:

Hat Black H extra, MC  
Naphtylamine Black S, TJ,  
T, SGG  
Naphtylamine Blue Black B  
Naphtol Black KLP.

For covered, cheap Blacks:

Naphtylamine Black SS2B  
Naphtylamine Black SS3B,  
SOO.

For so-called Glazed Hats:

Azo Merino Black 8B, 6B, 6BE  
Naphtol Black 6B, 3B  
for Jet Black, shaded with  
Acid Yellow AT.

For Velours and Plumed Hats:

Hat Black FC (for Blue-Black)  
Hat Black KS, KT (for Jet  
Black).

Dyeing directions on page 186.

Dyestuffs suited for shading:

Tetra Cyanole V  
Cyanole Green B, 6G

Indian Yellow G, FF  
Orange II, extra.

# ON HAT FELT.

Blacks of Very Good Fastness to  
Light, Steaming and Alkalies  
(for Stiffened Fur and Wool Bodies).

Blacks of very good Fastness to  
Light, Steaming, Alkalies and  
Alkaline Rinsing  
(for Stiff Fur and Wool Bodies and for  
such to be stiffened after the dyeing).

## For Blue-Black:

Hat Black 5BV, F, FC  
Naphtylamine Blue Black 5B

## For Jet Black:

Hat Black KST, KT,  
HV extra, H extra, MC  
Naphtylamine Blue Black B  
Hat Fast Black ST.

For shading, the easily levelling  
dyestuffs in the opposite column  
come into consideration.

Dyeing directions on page 186.

For After-Chroming Dyestuffs  
see column 4.

## For Particularly Cheap Blacks:

Naphtyl Blue Black N  
combined with  
Logwood,  
dyed on a mordant of bichrome,  
copper sulphate and oxalic acid.

Dyeing directions on page 187.

## For Blue-Black:

Hat Chrome Black B  
Anthracene Chrome Black  
5B, PBB  
Anthracene Acid Black DNG.

## For Jet Black:

Hat Chrome Black BT, KV  
Anthracene Acid Black CP  
Anthracene Chrome Black F  
Anthracene Chrome Black  
PPT extra  
Anthracene Chrome Black  
PFB extra  
Anthracene Chrome Black  
PPC extra.

## For covered, cheap Blacks:

Anthracene Acid Black DSF  
Anthracene Acid Black DSN  
Anthracene Acid Black  
DSFB.

## The most suitable shading dyestuffs:

Brilliant Milling Blue B  
Brilliant Milling Green B  
Tetra Cyanole A  
Anthracene Acid Blue ER, EB  
Anthracene Yellow BN.

Dyeing directions on page 186.

## DYEING OF LOOSE WOOL AND HAIR FOR MIXTURE FELT HATS.

*Anthracene Chrome, Anthracene Chromate and Anthracene Acid Colours* are used in the first place for the dyeing of loose wool and hair, according to the dyeing instructions and in the combinations indicated on pages 21—40 and 79—85 in the chapter on "The Dyeing of Loose Wool".

The shades thus obtained answer every requirement made in the hat industry with respect to fastness and as to leaving the material unimpaired; they withstand both alkaline and acid milling perfectly, and are exceedingly fast to light, hot pressing, steaming, carbonising and perspiration.

In the case of particularly severe acid-milling, the following colours are to be preferred:

### *For Grey, Mode and Brown Shades:*

Combinations of

Anthracene Blue Black C, BE, KG  
 Anthracene Chrome Blue G  
 Milling Yellow O  
 Anthracene Chromate Brown EB, WS, WG  
 Anthracene Chrome Red A

} for Wool:  
 Method X,  
 page 12;  
 for Hair:  
 Method a,  
 page 200.

dyed according to the after-chroming process

Further, combinations of

Alphanol Brown B  
 Milling Yellow O  
 Diaminogene extra  
 Alizarine Brilliant Green G

} Method b,  
 page 200.

### *For Green and Olive Shades:*

Combinations of

Alizarine Brilliant Green G, SE  
 Anthracene Chrome Blue G  
 Anthracene Blue Black C. BE, KG  
 Milling Yellow O  
 Anthracene Chromate Brown EB, WS, WG  
 Anthracene Chrome Red A

} Method X,  
 page 12;  
 Method a,  
 page 200.

died according to the after-chroming process

*For Yellow and Orange:*

Milling Yellow O	}	Method b, page 200.
Diamine Fast Yellow FF		
Diamine Yellow CP for Orange shaded with		
Diamine Scarlet B or combinations of		
Milling Yellow O	}	for Wool: Method X, page 12; for Hair: Method a, page 200.
Anthracene Chrome Red A after-chromed		

*For Pink, Red, Claret and Prune:*

Diamine Scarlet B, 3B	} after-chromed	Method a and b, page 200; for the after-chromed colours on wool: Method XI and XIV, pages 13 and 17.
Diamine Fast Red F		
Anthracene Chrome Red A		
Diamine Brilliant Bordeaux R		
Diamine Fast Violet FFRN for Prune shaded with		
Diaminogene extra		

*For Violet:*

Diamine Fast Violet BBN, FFBN, FFRN	
-------------------------------------	--

Method b, page 200.

*For Blue:*

Alphanol Blue BR extra	}	for Wool: Method VII and XI, pages 10 and 13; for Hair: Method a and c, pages 200 and 201.
for more severe steaming after- treated with bluestone		
Anthracene Chrome Blue F after-chromed		

*For Black:*

Anthracene Acid Black DSN, DSF,	} DSFB	for Wool: Method X, page 12; for Hair: Method a, page 200.
Anthracene Chrome Black 5B, F, P extra,		
PFB extra, PPT extra after-chromed		

For particulars regarding the production of mixture felts possessing particularly good fastness to light, see the method described on pages 40 and 155 et seq.

In addition to Anthracene Acid Black and Anthracene Chrome Black, Naphtylamine 635 J (according to Method IV, page 7) is applied frequently for light acid milling.

*Loose hair* is dyed like loose wool, considerably more dyestuff however being required for hair than for wool; the quantities of dyestuff vary from twice to four times the quantity required for wool, according to the quality of the material.

*Hair for Ladies' Velours Hats*, which are partly dyed in the loose state, is dyed with easily levelling dyestuffs fast to acid milling.

For combinations best suited for the purpose, see the tables on pages 188—197.

It is an advantage to dye hair in machines, by which method the material is best preserved and felting avoided. When only open kettles are available, any immoderate handling or boiling should be carefully avoided, because loose hair is considerably more apt to felt than loose wool.

In order to remove any traces of acid or mercury mordant, it is essential that the hair be soaked thoroughly in hot water before the dyeing, or boiled for  $\frac{1}{2}$  hour, whereupon the machine should be charged with fresh water.

#### Directions for Dyeing Rabbit or Hare Flue with the above named colouring matters.

##### *a) For Chrome Colours:*

Charge the bath with the previously well dissolved dyestuff and 5% Glauber's salt, commence dyeing at 30—40° C. (85—105° F.), work for  $\frac{1}{4}$  hour at this temperature, raise gradually to the boil, and dye for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour at the boil. In order to exhaust the bath, add gradually 3—5% acetic acid, and after  $\frac{1}{2}$  hour, a little sulphuric acid if necessary (for Black 4—5%), well diluted with cold water. Hereafter cool the bath off thoroughly, and chrome for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour at the boil with the quantities of bichrome indicated.

As the bath does not become completely exhausted, it is an advantage in the case of dark shades and Blacks to chrome in a fresh bath with the addition of 1—2% sulphuric or hydrochloric acid.

In the case of Blacks, the dyeing is commenced straight-away at 70° C. (160° F.) and the addition of 5% acetic acid, the bath being immediately raised to the boil.

##### *b) For Diamine Colours and Acid Colours Fast to Milling:*

Commence dyeing at 30° C. (85° F.) with the addition of 5—10% Glauber's salt, raise gradually to the boil, and exhaust after  $\frac{1}{2}$  to  $\frac{3}{4}$  hour's boiling by adding 3—5% acetic acid.

*c) For Alphanol Blue:*

Start dyeing with the addition of 5% Glauber's salt, 5% acetate of ammonia and  $\frac{1}{4}$ — $\frac{1}{2}$ % bichrome at about 30° C. (85° F.), work at this temperature for  $\frac{1}{2}$  hour, heat to 80—90° C. (175—195° F.) within  $\frac{3}{4}$  hour, and dye at this temperature for 1 hour.

The bath may be exhausted by the gradual addition of 2—3% acetic acid well diluted with water.

## PRODUCTION OF MIXTURE FELTS BY DYEING READY-MILLED HAT BODIES.

Mixture effects similar to those produced by mixing material dyed in the loose state may be obtained by dyeing milled hat bodies.

For this purpose the undyed wool is mixed with white vegetable fibre (China-grass, cotton, etc.), milled as customary, and dyed with dyestuffs which leave the vegetable fibres undyed.

The dyestuffs best suited for this article are the following:

Fast Yellow S	Tetra Cyanole, all brands
Acid Yellow AT	Brilliant Milling Blue B
Naphtol Yellow S	Indigo Blue N, SGN
Orange GG	Blue PC (No 9623)
Azo Orseille BB, BE	Azo Fast Blue, all brands
Lanafuchsine, all brands	Azo Wool Blue, all brands
Acid Magenta	Azo Navy Blue B, 3B
Brilliant Scarlet,	Acid Navy Blue A
all brands	Azo Merino Blue G, 3B
Crystal Scarlet 6R	Cyanole Green B, 6G
Scarlet FR, F2R, F3R	Cyanole Fast Green G
Naphtol Red C, EB	Fast Acid Green BN, B
Amaranth	Acid Green, all brands
Azo Red A	Naphtylamine Black
Azo Rubine A	EFF
Acid Violet 6BS, 4RS	Naphtylamine Black
Formyl Violet, all brands	S
Azo Wool Violet 7R, 4B	Naphtylamine Blue
Cyanole, all brands	Black 5B, B

for Black

In the case of higher demands with regard to fastness to light, it is well to use, for mode shades,

Combinations of

Alizarine Cyanole EF, SR,	Brilliant Lanafuchsine
SB, SG	GG, BB, SL
Fast Acid Yellow TL, 3G	Alizarine Cyanole Violet R
Orange GG	Azo Fast Violet 2R.

The method of dyeing is that indicated on pages 182 and 185. For the production of effects as clear as possible, attention should be paid to thorough exhaustion of the dyebaths. After the dyeing a thorough rinsing is indispensable in order to remove the sulphuric acid.

*Note:* Coloured effects may be produced either by using vegetable fibre previously dyed fast to acid, or by dyeing the vegetable fibre with suitable Diamine Colours in a fresh cold bath subsequent to the acid dyeing of the hats.

## PRODUCTION OF TWO-COLOURED HATS BY DIRECT OR DISCHARGE PRINTING.

### *a) Production of Coloured Effects on a Light Ground.*

The hat bodies which may be white or dyed to any given shade are either painted over with suitable dyestuff solutions or printed with print pastes in any pattern desired. Then they are dried but very slightly, steamed for 1 to 1½ hours with damp steam, washed in running water, and dried.

This style can be produced in various ways, for instance one side of the hat may be coated with any print colour desired, or both sides of the hat may be coated either with the same colour or with different colours. Then again, instead of colouring the whole hat, only a portion of it may be coloured, for instance the brim or the crown, or again, in the case of long-haired mohair hats, only the raised upper hairs are coloured in order to produce mixture effects.



The colour may be applied simply by hand, the hat body being fixed on a rotating block and the colour applied evenly by means of a brush while the hat is rotating slowly.

The following points have to be observed:

As small a quantity of colour as possible should be applied. The print colours are first brushed quite lightly over the hat and are then distributed as evenly as possible.

According to the quality of the felt, either thick or thin colour pastes are applied. Weak, thin felts require a thicker paste, whereas for strong and tightly milled felts thin pastes are to be given the preference.

The colours should only be allowed to dry very lightly after they have been applied; if dried too much, an unsatisfactory fixation of the colours will result and they will bleed on to the light ground colours in the washing. The steam must have a sufficient amount of moisture. The print colours will not be fixed sufficiently well by dry steam; on the other hand, if the steam is too moist, the colours are apt to penetrate to the other side of the material during the steaming.

The steaming may be done either in the steaming-box or under the steam-recipient.

For hat printing, either British gum or tragacanth are the most suitable thickening agents. The dyestuffs given for wool printing may likewise be used for hat printing. The following are especially well suited for the purpose:

*For Black:*

Naphtol Black BG conc.

*For Blue:*

Brilliant Milling Blue B

Formyl Violet S4B—10B

shaded with

Brilliant Milling Green B

*For Navy and Dark Blue on a white ground colour:*

Azo Wool Violet 4B in combination with

Brilliant Milling Green B

*For Violet:*

Formyl Violet S4B—10B

Azo Wool Violet 7R

*For Red:*

Diamine Scarlet B, 3B

*For Green, Olive and Brown:*

Combinations of

Brilliant Milling Green B

Milling Yellow O

Amaranth or

Lanafuchsine 6B.

*For Grey and Mode Shades:*

Combinations of

Tetra Cyanole V

Milling Yellow O

Acid Yellow AT

Lanafuchsine SG or

Amaranth.

Preparation of the Colour Pastes to be brushed  
on to the material.

*For Black:*

Dissolve	60	parts	Naphtol Black BG conc. in
	412	„	hot water and boil with
	250	„	British gum.
			When cold, add
	15	„	chlorate of soda dissolved in
	25	„	water,
	28	„	oxalic acid, dissolved in
	180	„	water, and
	5	„	sulphuric acid 168° Tw., diluted with
	25	„	water.
	1000	parts.	

*For Diamine Scarlet:*

	20	parts	Diamine Scarlet are dissolved in
	805	„	water and boiled with
	160	„	British gum and
	15	„	phosphate of soda.
	1000	parts.	

*For Blue, Violet, Green, Olive, Brown, Grey etc.*

3—	40	parts	dyestuff	are	dissolved	hot	in
697—	660	„	water,	and	boiled	with	
200	„	British	gum.				
			When cold, add				
	100	parts	acetic acid	8°	Tw.		
		1000	parts.				

In the place of British gum, tragacanth may be used. 200 parts British gum may in such case be substituted by about 400—450 parts solution of tragacanth 80 : 1000.

*Preparation of tragacanth solution 80 : 1000.*

80	parts	tragacanth	are	soaked	in	
420	„	water	for	about	48	hours; then
500	„	water	are	added,	and	the whole is boiled
			until	an	even	mucilage is formed.

1000 parts.

When using Lanafuchsine SG and 6B, it is an advantage to add 3—5 parts chlorate of soda dissolved in 15 parts water per 1000 parts print paste.

Any dyestuff suitable for hat dyeing may be used for the ground colours of the hats.

Cloudiness of the white ground may be removed by brushing on a paste of whitening or zinc-white to which a trace of Formyl Violet has been added. Any surplus of whitening must be removed by brushing or beating the hats when dry.

*b) Production of White and Coloured Effects by means  
of Discharging.*

White and coloured effects may be obtained on a darkish ground by discharging with Hyraldite CW extra. If the ground is red, it is an advantage also to use a tin crystals discharge.

The white discharges are used principally for tipping long-haired mohair hats or for producing mixture effects, and not so much for large surfaces such as for the discharging of brims.

For the dyeing of the bodies the following dyestuffs which may be easily discharged with Hyraldite come into consideration:

Acid Yellow AT	Naphtol Red C
Fast Acid Yellow TL	Acid Violet 4RS
Fast Yellow S	Azo Wool Violet 7R
Orange extra, II, R, GG	Cyanole FF, extra
Lanafuchsine SG	(for Light Blue)
Brilliant Lanafuchsine SL	Tetra Cyanole extra
Scarlet FR, F2R, F3R	Azo Wool Blue C
Brilliant Scarlet GG—3R	Discharge Blue BG conc.
	Naphtylamine Black EFF.

With the exception of Acid Violet 4RS, Cyanole, Tetra Cyanole and Discharge Blue these dyestuffs are also dischargeable by means of tin salts.

The dyeing is done in the manner customary for Acid Colours, with the addition of Glauber's salt and with a subsequent addition of sulphuric acid, as described on pages 182 and 185.

### Recipes for Discharges.

#### *White Discharge:*

300 parts Hyraldite CW extra are heated together with  
 150 „ water,  
 50 „ glycerine and  
 500 „ neutral starch-tragacanth thickening for  
 about 20 minutes up to 70° C.  
 (160° F.), stirred until cold, and  
 passed through a fine sieve.

1000 parts.

#### *Coloured Discharge:*

20—50 parts dyestuff are dissolved in  
 580—550 „ water, and boiled with  
 200 „ British gum; during the cooling,  
 100—200 „ Hyraldite CW extra are added; when  
 cold the colour is passed through a  
 fine sieve.

1000 parts.

Instead of British gum, gum tragacanth may be used.

The following dyestuffs may be used as additions to the discharges:

*For Yellow:*

Thioflavine T  
Diamond Phosphine GG,  
PG, R, D \*Azo Orseille BB.  
Paraphosphine R, G, GG.

*For Red:*

Erythrosine B  
Eosine GG

*For Violet:*

\*New Methylene Blue N  
with  
Irisamine G  
or  
\*Thiocarmine R with  
Azo Orseille BB.

*For Blue:*

\*New Methylene Blue N

*For Green:*

\*New Methylene Blue N  
with  
Thioflavine T  
or with  
Diamond Phosphine GG  
\*Thiocarmine R.

*For Grey:*

\*Nigrosine (soluble in water)  
\*New Blue B.

*For Brown:*

Diamond Phosphine D with \*New Blue B  
Irisamine G and  
New Blue B.

*For Mode:*

Diamond Phosphine R and D  
with  
\*New Blue B  
or with  
Nigrosine (soluble in water).

In the case of the dyestuffs marked with an asterisk (\*) it is an advantage to gently chrome after the steaming — about  $\frac{3}{8}$  oz bichrome per 10 gallons — in order more rapidly to develop the coloured discharge. A short treatment of the discharged portions over open steam promotes the developing of the discharge colours.

### Tin Crystals Coloured Discharge.

(Especially for Discharging on a red ground.)

20 parts dyestuff are dissolved in  
580 „ water and boiled up with  
260 „ British gum and  
40 „ glycerine. When cold  
40 „ tartaric acid 1:1 and  
60 „ tin crystals are stirred into the solution.

1000 parts.

The following dyestuffs may be used as additions to the tin crystals discharges.

*For Yellow:*

Thioflavine T  
Diamond Phosphine GG,  
PG, R, D  
Para Phosphine GG, G, R.

*For Green:*

Cyanole Fast Green G  
Cyanole Green B, 6G  
Brilliant Milling Green B  
Acid Green extra conc.  
Acid Green extra conc. B.

*For Blue:*

Formyl Blue B  
Brilliant Milling Blue B  
Cyanole extra, FF  
Tetra Cyanole V, extra  
Alkaline Blue 6B—3R  
Solid Blue R, 3R.

*For Grey:*

Nigrosine (soluble in water)  
New Blue B.

*For Red:*

Azo Orseille BB  
Rosazeine B  
Erythrosine B  
Eosine, all brands.

*For Violet:*

Formyl Violet, all brands.

The brushing-on of the discharge pastes is done in the same manner as for direct prints, viz. by means of a brush. After a slight drying, the Hyraldite discharges are *steamed for 5 to 10 minutes with full steam as dry as possible and the tin crystals discharges for ½ hour with damp steam without pressure*, the goods being then well rinsed in running water, and finally dried.

## SILK DYEING.





## A. DYEING OF SILK IN THE HANK.

**Preparing and Degumming.** Dyed silk is classed as *Ecreu* or *Hard Silk* (silk in the raw state), *Souple Silk* (silk dyed in the half ungummed or softened state) and *Cuite Silk* (silk dyed in the boiled-off, discharged or degummed state). *Ecreu Silk* is used only very rarely, and *Souple Silk* to a smaller extent than *Cuite Silk*.

*Ecreu Silk* is merely washed previous to the weighting and dyeing; *Souple silk* is softened, and *Cuite silk* is boiled off. Silk loses but very little in weight by washing for producing *Ecreu silk*, and in the process of soupling about 5—10% of its original weight, whilst in degumming for producing *Cuite silk* it loses about 18—24% of its original weight according to its origin and quality. The process of soupling may be carried out with sulphurous acid, hydrochloric acid, tartaric acid etc.; silk treated in this manner has a dull, semi-lustrous appearance as compared with boiled-off silk. Only the latter attains a high lustre and silky softness. The silk may be weighted and dyed in any of the three stages of degumming, the principles of the dyeing being very much the same in each case.

The degumming of genuine, thrown silk of *Bombyx mori*, i. e. (mulberry silk or Italian, Japanese, Chinese etc. organzine or tram silk) is usually effected in a neutral soap bath in a wooden vat. The bath should be as short as possible (the liquor amounting to about 20 to 25 times the weight of the silk) and charged with about 30—33% olive-oil soap or oleïne soap calculated on the weight of the silk. For every 100 lbs of silk, about 30—33 lbs soap are used in 200—250 gallons water as soft as possible. Raise the soap bath to the boil by means of indirect steam (a closed steam-coil), shut off steam, and when the liquor has ceased to simmer, enter the dry silk hanging on sticks so that one-half of the silk is in the liquor. Then push the sticks backwards and forwards carefully for half an hour,

turn, then throw out or lift out of the liquor; hereafter heat the bath once more to the boil in the same manner as before, and degum the other half of the hank in the same way for half an hour. After  $1\frac{1}{4}$  to  $1\frac{1}{2}$  hours, the silk is entirely freed from the gum. In the case of very heavy, yellow gum, a second weak bath is frequently given, which is also repeated for the preparation of very light delicate shades or for whites.

Besides this degumming *in a liquor*, discharging *in the froth* has been adopted frequently of late, which is said better to preserve the quality of the silk (particularly inferior kinds of China and Canton silk).

*Spun* silk (Chappe, Florette, Bourrette etc.) is usually boiled off in a soda bath only. Charge the bath with 10% soda crystals or about 4% soda ash (of the weight of the goods), treat as indicated above for about an hour near boiling heat, and then soap with 10% soap (this refers to light shades; for deep shades and Blacks the soaping as a rule is omitted). After discharging, rinse the silk in the vat in as soft water as possible, sour off generally with hydrochloric acid, rinse, and whizz.

**Weighting.** Three different methods are nowadays principally applied for weighting silk to be dyed with artificial dyestuffs, viz. (1) *Mineral Weighting*, (Charge minérale) consisting of a treatment with stannic chloride in combination with phosphate of soda, sulphate of alumina and silicate of soda, which is carried out previous to the dyeing; (2) *Vegetable and Mineral Weighting* (charge mixte) with stannic chloride before the dyeing and with tannin matter during or after the dyeing, and (3) *Vegetable weighting* (charge végétale) with tannin matter during or after the dyeing. Weighting with tin phosphate previous to dyeing and with tannins subsequent to dyeing is not much used in connection with artificial colouring matters. Weighting after dyeing, with substances soluble in water (for instance with sugar), is applied very rarely nowadays.

*Weighting with Stannic Chloride* (Oxymuriate of Tin). This method is now usually applied after the discharging. Treat the discharged silk after well whizzing or wringing for 1 to  $1\frac{1}{2}$  hours in a stannic chloride bath of 52—57° Tw.

at ordinary temperature. The stannic chloride should be of the greatest possible purity and free from nitric acid, stannous chloride, free chlorine, meta stannic acid etc. Hereafter whizz or wring as thoroughly as possible, and wash, to best advantage in a washing machine with a plentiful supply of cold water. At large works the tin is recovered from the wash water. After the whizzing or wringing off, take the silk for 1 hour on to a phosphate bath of about 70—75° C. (160—170° F.) usually titrating 7—9° Tw., sometimes however up to 13—15° Tw., whizz thoroughly, wash in the washing machine with a liberal supply of water, whizz once more, repeating these operations (stannic chloride, sodium phosphate) in the same way up to four times until the desired weight has been attained. — Both the stannic chloride bath and the phosphate bath should each time be brought up again to their original concentration; furthermore, in order to neutralise the acid brought into the bath by the acidity of the silk, a little soda or ammonia, after repeated use, should be added to the phosphate bath, just enough to produce in the solution with phenol phtaleine at least a faint pink colouration.

After the last phosphate bath the silk is entered into a bath of sulphate of alumina of about 40—50° C. (105—120° F.) titrating 7° Tw. in which the silk is left for about 1 to 1½ hours. Hereafter it is washed well, whizzed, and worked in a bath of silicate of soda of 50—55° C. (120—130° F.). The concentration of the latter is regulated by the degree of weighting, and varies from 3 to 10° Tw. In this bath the silk is left for about an hour, and then rinsed thoroughly.

The tin and phosphate baths may be applied from one to four times successively before the treatment with sulphate of alumina and silicate of soda is carried out. Hardly more than four tin-phosphate passages, which weight the silk nearly by 100 per cent over pari, are given nowadays. It has been found impracticable to apply sulphate of alumina and silicate baths in between the tin and phosphate baths. By varying the treatments, i. e. by using more or less concentrated baths at a higher or lower temperature, or by omitting the sulphate of alumina bath etc., different degrees of weighting result. With average concentrations and temperatures applied for average qualities of silk, the following degrees of weighting are ensured:

Pari weighting by treating once in each of the four baths (stannic chloride, phosphate, alumina, silicate),  
 30—40% over pari with two dips tin and phosphate  
 and one of alumina and silicate,  
 50—60% over pari with three dips tin and phosphate  
 and one of alumina and silicate,  
 70—80% over pari with four dips tin and phosphate  
 and one of alumina and silicate.

For the *charge mixte weighting*, a soda bath is used instead of the phosphate bath, and 130—150% extract of sumac or gall nuts are usually used for the subsequent vegetable weighting. This weighting is considerably more expensive than pure mineral weighting, but the goods are more durable when weighted according to this method. With three tin-soda passages and 120—150% sumac extract 48° Tw. a total weighting of 20—30% over pari is to be expected as normal.

The *charge végétale weighting* increases the weight only moderately; when using 150—200% extract of sumac or gall nuts, a weighting of up to 10% over pari is obtained.

*Tannins.* The tannins which come into consideration for Colours are extract of sumac and gall nuts, for Blacks and Browns, cutch and divi-divi extract: for light shades it is best to use decolourised (bleached) extract. Dye in the customary manner in a boiled-off liquor acidulated with acids, keeping the shade a little brighter than is required; then add 100—200% extract 42—52° Tw., and treat the goods until the bath has cooled down to about 40° C. (105° F.); hereafter match off once more, dye to shade if necessary, rinse in cold water, and brighten. The tannin baths are not exhausted, and for deep shades may be used repeatedly.

*Bleaching.* For light or for very bright shades as well as for white it is necessary to bleach the discharged silk by stoving, or by means of hydrogen or sodium peroxide.

*Stoving:* After whizzing well, take the degummed silk in handfuls through a cold neutral soap bath, wring off

evenly, and stove overnight in the stoving chamber. After rinsing thoroughly, soap warm; white silk is blued at the same time with Methyl Violet, Crystal Violet, Alizarine Cyanole Violet, Brilliant Milling Blue B or Alkaline Blue.

*Bleaching with Hydrogen or Sodium Peroxide:* In a clean wooden, earthenware or enamelled vessel provided with a leaden steam-coil, prepare a very concentrated bath, according to the desired bleaching effect and the purity of the silk:

a) For hydrogen peroxide with

100—200% hydrogen peroxide 12 percent by volume reckoned on the weight of the silk and enough silicate of soda to make the bath slightly alkaline;

b) For sodium peroxide with

7—14% sodium peroxide and  
9.5—19% sulphuric acid 168° Tw.

Sulphuric acid is added first to the bath, then gradually sodium peroxide whilst stirring continually, and finally silicate of soda as stated above.

Raise the temperature of the bath to 40—50° C. (105—120° F.), enter the degummed silk, raise the temperature within an hour to boiling point, immerse the silk, and leave it for about 8 hours or overnight in the bleaching bath, taking care that the goods are completely covered by the liquor all the time. Hereafter sour off with sulphuric acid, rinse, and dye, or, in the case of white, soap boiling hot, and blue in a fresh warm soap bath as indicated for stoved goods.

The bleaching effect may of course be enhanced by using larger amounts of peroxide; very good effects may also be obtained by adding  $\frac{1}{2}$ —1 lb olive-oil soap per 10 gallons to the bleaching bath already charged with silicate of soda, or by an aftertreatment for one hour in a cold bath consisting of 3 gallons bisulphite 64° Tw. and 5 lbs concentrated sulphuric acid per 100 gallons.

**Dyeing:** The dyeing of hank silk is done in wooden vats which are frequently lined with copper, or copper vats may likewise be used for the purpose; direct steam is used for heating the baths.

The following dyestuffs are used for dyeing:

*I. Acid Colours* answer ordinary requirements for fastness and are therefore used most frequently.

*II. Basic Colours* come into consideration principally for bright and full shades which are not required to possess special properties of fastness; these are used mainly for the dyeing of silk weighted with stannic chloride.

*III. Diamine Colours* are applied principally for dyeings fast to water, washing and milling for embroidery and sewing silks, effect threads and other special uses.

*IV. Immedial Colours* are used exclusively for producing dyeings of best possible fastness to washing, milling, boiling and acids.

*V. Anthracene Colours* may be used for the same purposes as Immedial Colours.

### Acid Colours.

Fast Acid Yellow TL, 3G	Wool Red B
Acid Yellow AT	Brilliant Lanafuchsine
Milling Yellow O	BB, SL, GG
Naphtol Yellow S	Azo Orseille BB
Indian Yellow G, FF, R	Lanafuchsine 6B
Orange GG, extra, EN	Azo Wool Violet 7R
Brilliant Croceïne R, B, M,	Rose Bengale extra N
2B, 3B, 5B, 6B, 7B, 9B	Rosazeïne B
Croceïne AZ	Phloxine
Brilliant Scarlet GG, G, R,	Erythrosine B, extra, N, D
2R, 3R, 4R, 6R	Eosine L, GGF, 3G
Crystal Scarlet 6R	Acid Violet 6BS, 6BC
Scarlet EC	Formyl Violet 4BF, S4B,
Brilliant Cochineal 2R, 4R	6B, 8B, 10B
Roccelline	Alkaline Violet CA, C
Naphtol Red EB, C	Azo Fast Violet 2R
Azo Rubine A	Alizarine Cyanole Violet R
Azo Red A	Lanacyl Violet BF
Amaranth, B	

Acid Green extra conc.,	Brilliant Milling Blue B
extra conc. B	Solid Blue R, 3R
Cyanole Fast Green G	Lanacyl Blue BN, RN
Brilliant Milling Green B	Naphtol Blue G
Fast Acid Green BN	Alphanol Blue GN,
Cyanole Green B, 6G	BR extra, 5RN
Alizarine Brilliant Green G	Induline 3B, B
Naphtol Dark Green G	Silver Grey N
Naphtol Green B	Aniline Grey B, R
Cyanole FF, extra	Nigrosine (soluble in water)
Tetra Cyanole V, SF,	Alphanol Brown B
extra, A	Alphanol Black BG, 3BN,
Alizarine Cyanole SG, SB,	KBB, KV, KWAN conc.
SR, EF, B	Black for Silk DB
Methyl Blue for Silk	Naphtylamine Black 6B, 4B,
Blue PBS, BS, FS, RRS	X3B
Pure soluble Blue	Neutral Wool Black G
Water Blue B, R	Naphtol Blue Black
Alkaline Blue 6B, 5B, 4B,	Naphtyl Blue Black FBB
3B, 2B, B, R, 2R, 3R	Anthracite Black R, B.
Formyl Blue B	

### *Dyeing Directions for Acid Colours.*

The Acid Colours are as a rule dyed in a boiled-off liquor slightly acidulated with sulphuric acid.\* Enter the goods at 40—50° C. (105—120° F.), raise the temperature of the bath gradually to the boil, and dye near boiling temperature for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour. If necessary in order to exhaust the bath, add more acid, and treat for a short time in the bath whilst cooling off, particularly in the case of full shades.

After dyeing, rinse, and brighten according to the directions on page 224.

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\* If no boiled-off liquor be available, a very useful substitute may be obtained as follows:  $1\frac{1}{2}$  lbs soap, 5 oz glue or gelatine,  $1\frac{1}{2}$  oz olive-oil and  $1\frac{1}{2}$  oz common salt are boiled up well together with about 5 gallons water. The solution is used in the same way as boiled-off liquor; the sulphuric or acetic acid should be added very slowly to the dyebath whilst stirring well.



The following dyestuffs are best dyed in a bath acidulated with acetic acid:

Milling Yellow O	Lanacyl Blue BN, RN
Rosazeïne B	(in light tones)
Rose Bengale extra N	Alphanol Blue, all brands
Phloxine	Alkaline Violet CA, C
Erythrosine	Alphanol Brown B
Eosine	Alphanol Black, all brands
Alizarine Brilliant Green G	Naphtyl Blue Black FBB
Naphtol Green B	Anthracite Black R, B

The dyeing is carried out as afore indicated. In the case of Naphtol Green, Alphanol Black, Naphtyl Blue Black and Anthracite Black 2—4% sulphuric acid are gradually added after  $\frac{1}{2}$  hour's dyeing, in order to exhaust the bath.

Alkaline Blue and combinations of the same with Alkaline Violet are dyed boiling hot in a neutral soap bath (hard water should be corrected by previously boiling it with some soda), and after rinsing the goods, and the Blue is developed by  $\frac{1}{4}$  hour's working at 60—70° C. (140—160° F.) in a bath well acidulated with sulphuric acid.

### Basic Colours.

Thioflavine T, TCN	Methyl Violet 6B, 4R
Diamond Phosphine GG, R	Crystal Violet 10B
Para Phosphine R, G, GG	New Methylene Blue
Chrysoïdine AG, FN	GG, N, R, 3R
Bismarck Brown	Methylene Blue BB
FFG, GG, EE	Victoria Blue B
Tannin Orange R	Indazine M
Magenta Ia Dia. yellow	Naphtindone BB, BR
shade	Blue for Silk KA
Safranine GGS, G extra	Green for Silk MS
No 0, S No 150	Solid Green Crystals O
Irisamine G	Brilliant Green Crystals
Rosazeïne 6G	extra
Cerise Ia	Black for Artificial Silk
Tannin Heliotrope	BN, TN, GN.

### *Dyeing Directions for Basic Colours.*

Basic Colours are dyed in a boiled-off liquor slightly acidulated with acetic acid, entering the goods at 50—60° C. (120—140° F.) raising the temperature gradually to 80—90° C. (160—195° F.), and dyeing for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour. In the case of full shades it is well to exhaust



the bath by continuing to dye for a short time in the cooling liquor.

The dyed silk is rinsed and brightened according to the directions given on page 224.

### Diamine Colours.

Thioflavine S	Diamine Brilliant Blue G	diazotised and developed
Diamine Yellow CP	Diamine Dark Blue G	
Diamine Fast Yellow A, FF	Diamine Steel Blue L	
Diamine Orange G, D, F	Diamine Green CL, G, FG	
Oxy Diamine Orange G, R	Diamine Dark Green N	
Diamineral Brown G	Diamine Fast Grey BN	
Diamine Fast Brown	Diamine Black HW	
G, R, GB	Primuline	
Diamine Catechine 3G, G	Diamine Azo Scarlet A, B	
Oxy Diamine Brown G	Diamine Azo Bordeaux B	
Diamine Brown 3G, R, B, M	Diamine Orange D	coupled with Nitrazol C
Diamine Scarlet B, 3B	Diamine Cutch	
Diamine Purpurine B, 6B	Diamine Brown M, S	
Diamine Fast Red F	Diamine Sky Blue	
Diamine Rose GD, BD, FFB	Diaminogene Sky Blue N	
Diamine Fast Scarlet 8BN	Diaminogene Blue	
Diamine Bordeaux S	BB, 3RN, 6RN	
Diamine Brilliant	Diaminogene Dark Blue	
Bordeaux R	Diamine Azo Blue R, RR	
Diamine Brilliant Rubine S	Diamine Blue 2B	
Diamine Fast Violet FFRN,	Diamine Black BH	
FFBN, BBN	Diaminogene extra, B	
Diamine Violet N	Diamine Fast Yellow A	
Oxy Diamine Violet B	Diamine Nitrazol Brown	
Diamine Heliotrope B, G	GF, G, BD, RD	
Diamine Sky Blue FF	Diamine Nitrazol	
Diamine Blue RW, 2B,	Bordeaux GB	
3B, 3R	Diamine Nitrazol Green	
Diamine Fast Blue FFB	GF, BB	

### *Dyeing Directions for Diamine Colours.*

The Diamine Colours are dyed best in a boiled-off liquor acidulated with acetic acid, very light shades in a neutral soap bath (without acid). Enter at about 40° C. (105° F.), raise gradually to the boil, and dye near boiling temperature for abt.  $\frac{3}{4}$  hour; hereafter add if necessary a little acetic acid in order to better exhaust

the bath in the case of full shades, or for weighted silk gradually add some sulphuric acid.

Diaminogene extra and B (for Black) is always dyed best with an addition of 2—4% sulphuric acid.

After dyeing and rinsing, the silk is brightened as indicated on page 224, or it is diazotised and developed, coupled or aftertreated, previous to brightening.

### Immedial Colours.

Immedial Yellow GG, D	Immedial Brilliant Green
Immedial Yellow Olive 5G	G extra
Immedial Cutch O, OG, OR	Immedial Dark Green B
Immedial Brown BR	Immedial Deep Green G
Immedial Dark Brown	Immedial Black
D conc.	NNG conc.
Immedial Bordeaux GF conc.	Immedial Black
Immedial Prune S	NBB conc.
Immedial Violet CR, CB	Immedial Black
Immedial Indone Violet	BF conc.
B conc.	Immedial Black
Immedial Indone BBF conc.,	BF conc.
JBf conc., R conc., RR conc.	Immedial Black
Immedial Olive GG	BZ conc.
Immedial Green BB extra,	Immedial Black AZ
GG extra	

for Grey and  
for shading

for Black

### *Dyeing Directions for Immedial Colours.*

Immedial Colours are dissolved with sodium sulphide, with the addition of glucose (grape sugar).

Immedial Yellow D
Immedial Yellow Olive 5G
Immedial Olive GG
Immedial Cutch O, OG, OR
Immedial Brown BR
Immedial Dark Brown D conc.
Immedial Bordeaux GF conc.
Immedial Prune S
Immedial Violet CR, CB
Immedial Green BB extra, GG extra
Immedial Brilliant Green G extra
Immedial Deep Green G
Immedial Dark Green B
Immedial Black NNG conc.,
NBB conc., BF conc., BZ conc.

require the same quantity of sodium  
sulphide crystals as dyestuff

Immedial Yellow GG	} require double the quantity of sodium sulphide crystals as dyestuff
Immedial Indone, all brands	
Immedial Indone Violet B conc.	

Immedial Black AZ	} two-thirds the quantity of sodium sulphide crystals as dyestuff.

For medium and light shades, the quantity of sodium sulphide should be increased to about double or four times the weight of the dyestuff used.

Boil the dyestuff for about 10 minutes in a wooden vat provided with an iron steam-pipe with the requisite amount of sodium sulphide and twice as much glucose as sodium sulphide, in a small quantity of water, and add the solution to the boiling hot dyebath, prepared with thirty times the weight of water as of material to be dyed, and with

1½ oz soda ash  
 4 oz Turkey-red oil  
 0—1 lb desiccated Glauber's salt (according to the depth of shade to be dyed)

per 10 gallons. Treat the silk for abt. 1 hour, best on bent rods, press off lightly, rinse immediately and thoroughly in cold water, soap hot, and brighten in accordance with the directions on page 224.

The best kind of dye vat to use is an ordinary wooden vat with an iron coil; copper or brass fittings or copper steam-pipes in the dye-vessel must on no account be used.

For *Black*, it is advisable to mordant the boiled-off silk with nitrate of iron of about 35° Tw., and then to dye it after a very good rinsing.

The dyebaths are not exhausted, and should be kept for further use. In this case ¼—¾ of the dyestuff quantities originally used are added to the old liquor, whereas the liquor required for replenishing the bath is charged with ¾ oz soda, 4 oz Turkey-red oil and 0—8 oz Glauber's salt per 10 gallons. The dyestuff should be dissolved with sodium sulphide and glucose as indicated above.

### Anthracene Colours.

Anthracene Yellow BN	Anthracene Acid Brown N
Anthracene Yellow C	Anthracene Acid Brown B
Anthracene Acid Brown G	Anthracene Acid Brown V
Anthracene Acid Brown R	Anthracene Acid Black DSF.

*Dyeing Directions for Anthracene Colours.*

## a) After-Chroming Process.

Dye in a boiled-off liquor slightly acidulated with acetic acid. Enter the goods at about 40° C. (105° F.), raise the temperature gradually to near boiling point, exhaust the bath at about 90° C. (195° F.) after ½ hour's treatment by the gradual addition of a little acetic acid, and hereafter treat for ½ hour near boiling temperature in the same bath with chromium fluoride.

Finally soap hot, rinse, and brighten as indicated on page 224.

## b) On a Chrome Mordant.

The discharged and well rinsed silk is placed overnight in basic chromic chloride 32° Tw., care being taken that the goods are thoroughly immersed in the mordant. The silk is then wrung, well washed in as soft water as possible and to best advantage in a washing machine, fixed by ¼ hour's treatment in a cold bath of silicate of soda ½° Tw., washed once more in the washing machine, wrung off, and dyed.

The chromic chloride bath may be used repeatedly, in which case it must be brought first to 32° Tw.; the silicate bath on the other hand has always to be renewed.

The dyeing etc. is done as indicated under (a) in a boiled-off liquor slightly acidulated with acetic acid; the fastness to washing, milling and boiling may be slightly enhanced by a light after-chroming.

## Methods of Aftertreatment.

a) *Aftertreatment with Metallic Salts.*

This method of aftertreatment may be carried out either in the exhausted bath or in a fresh bath acidulated with acetic acid. Work boiling hot for 20 to 30 minutes, soap at 60—70° C. (140—160° F.), and brighten.

The quantities of the various metallic salts required are as follows:

- Chromium fluoride: The same quantity as of dye-stuff, but not more than 4%.
- Bichrome: One-half the quantity of the dye-stuff applied, but not more than 3%, or, in the case of Anthracite Black, only 0.5%.
- Copper sulphate: About double the quantity as of dyestuff, but not more than 4%.

*b) Aftertreatment with Tannin and Antimony.*

The dyed silk is entered, best overnight, into a hot bath of 50—60° C. (120—140° F.) which should contain, varying with the depth of the shade,  $\frac{1}{4}$ — $\frac{3}{4}$  lb of pure tannic acid per 10 gallons; then wring, and treat for  $\frac{1}{2}$  hour in a fresh, lukewarm bath with the addition of 2½—6 oz antimony salts per 10 gallons. Hereupon the goods may be aftertreated with 3% tin crystals and 2% hydrochloric acid for 20 to 30 minutes at 30° C. (85° F.) in order to increase the fastness to water and washing. Finally soap lukewarm, rinse, and brighten.

For less bright shades, the corresponding quantity of sumac, gallic extract etc. may be used instead of tannic acid. Regarding the resisting of silk to be used for effect threads in union goods dyed in the piece see the section on "Unions with Coloured Silk Effects".

*c) Diazotising and Developing.*

The dyed and rinsed silk is treated for  $\frac{1}{4}$  to  $\frac{1}{2}$  hour in a wooden vessel, in a cold bath, with the addition of

3— 4%	nitrite of soda	} calculated on the weight of the silk, and in proportion to the depth of shade to be dyed.
9—12%	hydrochloric acid 32° Tw.	
or 6— 8%	sulphuric acid 168° Tw.	

Then rinse, and enter directly into the cold developing bath.

The goods are passed for 20 to 30 minutes through this bath, rinsed, soaped hot, and brightened.

The following percentages of developers are employed according to requirement and depending on the depth of shade to be dyed, calculated on the weight of the silk:

- 1 —2 % Beta Naphtol, dissolved boiling with an equal quantity of caustic soda lye 77° Tw.
- 0.5—1 % Alpha Naphtol, dissolved boiling with an equal quantity of caustic soda lye 77° Tw.
- 0.7—1 % Phenylene Diamine, dissolved boiling with one-fourth of its weight of soda.
- 0.7—1.5% Diamine BB, mixed with cold water and dissolved cold with the addition of an equal quantity of hydrochloric acid 32° Tw.
- 0.7—1.5% Resorcine, dissolved boiling with twice its weight of caustic soda lye 77° Tw.

1—2% Bordeaux Developer, dissolved boiling hot with one-fifth of its weight of hydrochloric acid 32° Tw.

1—2% Fast Blue Developer AD, dissolved boiling with one-half of its weight of hydrochloric acid 32° Tw.

The solutions of the developers are best added to the developing bath through a fine wire sieve.

The fixing with soda, after the diazotising, is best carried out by treating the silk for 10 minutes in a luke-warm bath containing about 3 oz soda ash per 10 gallons.

The fixing with sulphuric acid after the diazotising is carried out by treating the silk for 10 minutes either in a cold bath or in a hot bath of 70—80° C. (160—175° F.), with the addition of 5% sulphuric acid.

#### *d) Coupling with Nitrazol C.*

This is done in a cold bath with

3—6 % Nitrazol C	} depending on the depth of the shade to be dyed.
1—2 % soda ash	
¼—½ % acetate of soda	

The dyed and rinsed silk is continually turned for ½ hour, then rinsed, soaped hot, and brightened.

Nitrazol C must be dissolved in cold water, and after carefully crushing any lumps that may have formed, the solution is then filtered.

#### **Brightening of the Silk.**

The object of the brightening is either to produce the silk scroop or on the other hand to impart to the silk a particularly soft handle, as well as to restore or increase its lustre which to a certain degree suffers through the various operations to which the silk is subjected, viz: the degumming, weighting and dyeing.

A difference is made between hard and soft brightening.

#### *Hard Brightening.*

The acids used for brightening in this case are acetic, formic, tartaric, citric and lactic acid, the three last mentioned imparting a particularly lasting handle to the silk. In some few cases sulphuric acid is still applied, but it can only be used in small quantities, whereas for weighted silk it is best to eliminate it altogether.

Add to the cold brightening bath enough of one of the afore-mentioned acids to give it a distinct acid taste, then give the dyed and rinsed silk a few turns in the bath, shade if necessary, whizz, and stretch at the wringing peg, drying finally at a moderate temperature.

The *brightening with oil* is frequently carried out in the following manner:

Boil with open steam 3—6% olive-oil with about one-half this amount of soda ash and three times the quantity of soft water to form an emulsion; add this emulsion to the brightening bath previously heated to about 30° C. (85° F.), and immediately enter the silk. Give the silk a few quick turns in this liquor, then acidify the bath with one of the acids mentioned, adding with advantage at the same time one of the protective agents mentioned below, then turn the silk again a few times, and finish it off in the customary manner. — Olive-oil and potassium hydrate emulsions are used for the same purpose.

Weighted silk is frequently impregnated at the same time with solutions of sulphocyanides, thiourea or hydroxylamine (which are patented as protective agents) in order to prevent it from becoming tendered.

### *Soft Brightening.*

This brightening is applied for silk — particularly for Chappe silk — which is used for velvet or plush. Prepare a softening bath by gradually stirring a solution of  $\frac{1}{2}$  lb soda ash into a solution of  $1\frac{1}{2}$  lbs alum, and bring this mixture up to 10 gallons liquor. Add to the cold brightening bath, mildly acidulated with acetic acid, as much of this solution as is necessary to obtain the desired soft handle, work the silk several times, whizz, and dry.



# DYESTUFFS FOR GREY, COMPOUND SHADES

Acid Colours	Basic Colours
<p style="text-align: center;"><u>Of normal Fastness:</u></p> <p style="text-align: center;">Combinations of</p> <p>*†Cyanole Green B, 6G            *Nigrosine (soluble in water)            *†Tetra Cyanole V, SF                (for bright Greys)            *Indian Yellow FF            *Orange extra, EN            *†Azo Orseille BB (for slight                additions of Red)            *Azo Rubine A            *Azo Wool Violet 7R.</p> <p style="text-align: center;">For Greys of good fastness to            water the following may be used:</p> <p style="text-align: center;">Silver Grey N            *Nigrosine (soluble in water)            Induline 3B, B            Aniline Grey B, R.</p> <p style="text-align: center;"><u>Of very good Fastness to Light:</u></p> <p style="text-align: center;">Combinations of</p> <p>*†Alizarine Cyanole EF            *†Alizarine Cyanole SB, SR                (for full shades)            *Fast Acid Yellow TL†, 3G            *†Acid Yellow AT (as a very                strong Yellow)            *Orange GG            *Brilliant Lanafuchsine BB                (for slight additions of Red)            *Azo Rubine A            *Brilliant Cochineal 2R            *Azo Fast Violet 2R            *Alizarine Cyanole Violet R.</p> <p style="text-align: center;">The dyestuffs marked with a            cross (†) become fast to water by            an aftertreatment with tannin and            antimony.</p>	<p style="text-align: center;"><u>Chiefly for Browns:</u></p> <p>Bismarck Brown FFG, GG, EE            Chrysoïdine AG, FN                shaded with            Paraphosphine G, GG            Safranine GGS            Cerisa Ia            Methylene Blue BB            Solid Green Crystals O</p> <p style="text-align: center;"><u>Of good Fastness to Water,            Washing, Milling, and Acid Boiling:</u></p> <p style="text-align: center;">Combinations of</p> <p>Methylene Blue BB            Indazine M            Diamond Phosphine                GG, R            Irisamine G            Rosazeïne 6G</p> <p style="text-align: right;">} aftertreated with                tannin and anti-                mony.</p>
<p style="text-align: center;">The dyestuffs marked with a            cross (†) become fast to water by            an aftertreatment with tannin and            antimony.</p>	<p style="text-align: center;">The dyestuffs enumerated in this            column are all particularly well            suited for tin-weighted silk.</p>
<p>The dyestuffs marked with an asterisk (*) are</p>	



# AND BROWNS ON SILK.

## Diamine Colours

Of very good Fastness to Water,  
Washing and Light:

Combinations of

- \*Diamine Dark Blue B
- \*Diamine Fast Yellow FF
- \*Diamine Fast Red F;  
for Brown,  
Diamine Brown 3G, R\*,  
B\*, M\*

may also be used.

Of very good Fastness to Light:

Combinations of

- \*Diamine Fast Blue FFB
- \*Diamine Yellow CP
- \*Diamineral Brown G
- \*Diamine Fast Red F.

Of very good Fastness to Water,  
Washing and Milling:

Combinations of

- |                     |   |
|---------------------|---|
| Diamine Dark Blue B | }<br>aftertreated with<br>chromium fluoride<br>or bichrome. |
| Diamine Fast Grey   |   |
| Diamine Brown B, M  |   |
| Diamine Fast Red F  |   |

For Brown, the following may also be used:

- \*Diamine Nitrazol Brown GF,  
G, BD, RD, coupled

or

- Diamine Brown M\*, S,  
diazotised, and developed with  
Beta Naphtol, or Phenylene  
Diamine,
- Diamine Cutch, diazotised and  
developed with soda, sulphuric  
acid or Fast Blue Developer AD.

The diazotised and coupled dyeings  
at the same time resist acid cross-  
dyeing.

particularly well suited for tin-weighted silk.

## Immedial and Chrome Colours

### Immedial Colours.

Of very good Fastness to Washing,  
Milling, Degumming and Cross-  
Dyeing.

Combinations of

- Immedial Black NNG conc.,  
NNB conc.. BF conc.
- Immedial Yellow Olive 5G
- Immedial Deep Green G
- Immedial Cutch O
- Immedial Dark Brown D conc.
- Immedial Bordeaux GF conc.
- Immedial Violet CR  
for Brown also
- Immedial Cutch O, OG, OR
- Immedial Brown BR
- Immedial Dark Brown D conc.

The fastness to light and to  
degumming may be further improved  
by ½ hour's aftertreatment in a  
fresh, boiling hot bath of

- 1—2% bichrome
- 1—2% copper sulphate
- 5% acetic acid

according to the depth of shade  
required.

### Chrome Colours

Of good Fastness to Washing, Mill-  
ing, Cross-Dyeing, and Light:

Combinations of

- Anthracene Acid Black DSF
- Anthracene Yellow BN, C
- Anthracene Acid Brown G, R,  
N, B, V.

Of excellent Fastness to Light and  
Degumming:

- Anthracene Yellow BN, C
- Anthracene Acid Brown R.

## DYESTUFFS FOR YELLOW, ORANGE

Acid Colours	Basic Colours
<p><b>Yellow and Orange.</b></p> <p><u>Of normal Fastness:</u></p> <p>Naphtol Yellow S } for  *†Acid Yellow AT } bright  *Indian Yellow G, FF, R } Yellow  *Orange extra, EN</p> <p><u>Of excellent Fastness to Light:</u></p> <p>*Fast Acid Yellow TL†, 3G  *Milling Yellow O (also of good fastness to water)  *Orange GG</p> <p><u>Of good Fastness both to Washing and Milling:</u></p> <p>*Milling Yellow O, aftertreated with tannin and antimony.</p> <p><b>Pink.</b></p> <p>*†Eosine 3G, GGF, L  *†Erythrosine D, extra N, B  *†Phloxine  *†Rose Bengale extra N.</p> <p><u>Of better Fastness to Light:</u></p> <p>*†Rosazeine B</p> <p><u>Very Fast to Light, but not quite so bright:</u></p> <p>*Brilliant Lanafuchsine GG, SL, BB  *Brilliant Croceine R, B, M</p> <p>The dyestuffs marked with a cross (†) become fast to water by an aftertreatment with tannin and antimony.</p>	<p><b>Yellow and Orange:</b></p> <p>Thioflavine T, TCN (for bright greenish Yellows)  Diamond Phosphine GG, R  Paraphosphine GG, G, R  Chrysoidine AG, FN  Tannin Orange R.</p> <p><u>Of good Fastness to Water, Washing and Milling:</u></p> <p>The above dyestuffs aftertreated with tannin and antimony.</p> <p><u>Of good Fastness to Washing, Milling and Cross-Dyeing:</u></p> <p>Thioflavine T, TCN } aftertreated  Diamond Phosphine } with tannin  GG, R } and antimony</p> <p><b>Pink.</b></p> <p>Irisamine G } for particularly  Rosazeine 6G } bright shades  Safranine GGS, S No. 150  Magenta Ia. Dia.</p> <p><u>Of good Fastness to Water, Washing and Milling:</u></p> <p>The above dyestuffs aftertreated with tannin and antimony.</p> <p><u>Of very good Fastness to Washing, Milling and Cross-Dyeing:</u></p> <p>Irisamine G } aftertreated  Rosazeine 6G } with tannin and antimony.</p> <p>The dyestuffs enumerated in this column are all particularly well suited for tin-weighted silk.</p>

The dyestuffs marked with an asterisk (\*) are

# AND PINK ON SILK.

## Diamine Couleurs

Yellow and Orange.

Of good Fastness to Water and

Washing:

Thioflavine S (for Greenish  
Yellows)

\*Oxy Diamine Orange G, R

Also very Fast to Light:

\*Diamine Yellow CP

Diamine Fast Yellow A, FF\*

Diamine Orange G, D, F\*

Thioflavine S, Diamine Fast Yellow A, FF, Oxy Diamine Orange G and D are of particularly good fastness to water. By subsequent tanning, Diamine Colours become faster to water.

Of very good Fastness to Water,

Washing and Milling:

\*Primuline, diazotised and developed, for Yellow with soda, for Orange with Resorcine.

\*Diamine Fast Yellow A  
\*Diamine Nitrazol  
Brown GF } coupled

Diamine Orange D, diazotised and developed with sulphuric acid

With the exception of Diamine Fast Yellow A, coupled, the dyestuffs possess at the same time good fastness to cross-dyeing.

Fast to Discharging and also very

Fast to Light:

\*Primuline, diazotised and developed with soda

\*Diamine Fast Yellow A,  
coupled.

Pink.

Of good Fastness to Water, Wash-

ing and Light:

\*Diamine Rose GD, BD, FFB

\*Diamine Scarlet B, 3B

\*Diamine Fast Red F

particularly well suited for tin-weighted silk.

## Immedial and Chrome Colours

Immedial Colours.

Yellow and Orange.

Of very good Fastness to Washing,

Milling, Degumming and

Cross-Dyeing:

Immedial Yellow GG

Immedial Yellow D.

For Orange shaded with

Immedial Bordeaux GF conc.

The fastness to light and degumming may be still enhanced by an aftertreatment with bichrome and copper sulphate (see page 227).

Chrome Colours.

Yellow and Orange.

Of very good Fastness to Washing,

Milling and Cross-Dyeing:

Anthracene Yellow BN

Anthracene Yellow C

Anthracene Acid Brown G

Anthracene Acid Brown R.

With the exception of Anthracene Acid Brown G, these dyestuffs withstand also degumming.

# DYESTUFFS FOR RED, CLARET

Acid Colours	Basic Colours
<p style="text-align: center;">Red and Claret. Of normal Fastness:</p> <p>Brilliant Scarlet, all brands Crystal Scarlet 6R *Scarlet EC Brilliant Cochineal 4R *Roccelline *Naphtol Red EB, C *Amaranth *†Azo Orseille BB (levelling particularly easily).</p> <p>Of very good Fastness to Light:</p> <p>*Brilliant Croceïne, all brands *Croceïne AZ *Brilliant Cochineal 2R Brilliant Lanafuchsine GG, SL, BB *†Lanafuchsine 6B, *Azo Rubine A *†Wool Red B, *Amaranth B.</p> <p style="text-align: center;">Violet.</p> <p>Of normal Fastness:</p> <p>†*Acid Violet 6BS, 6BC *†Formyl Violet 6B, 8B, 10B.</p> <p>Of very good Fastness to Light:</p> <p>*Azo Wool Violet 7R *Azo Fast Violet 2R *†Alizarine Cyanole Violet R (exceedingly good) *†Lanacyl Violet BF.</p> <p>Of good Fastness to Water and Washing:</p> <p>*Formyl Violet 4BF, S4B } these may be subsequently tanned for increasing their fastness. Alkaline Violet CA, C }</p> <p>The dyestuffs marked with a cross (†) become fast to water by an aftertreatment with tannin and antimony.</p>	<p style="text-align: center;">Red and Claret.</p> <p>Magenta Ia Dia. Magenta yellow shade Tannin Heliotrope Cerise Ia. Safranine GGS Safranine G extra 0 Safranine S No 150.</p> <p style="text-align: center;">Of good Fastness to Water, Washing and Milling:</p> <p>The afore mentioned dyestuffs aftertreated with tannin and antimony.</p> <p style="text-align: center;">Violet.</p> <p>Methyl Violet, all brands Crystal Violet 10B.</p> <p>Of very Good Fastness to Water and Good Fastness to Washing and Milling:</p> <p>The afore mentioned dyestuffs aftertreated with tannin and antimony.</p> <p>Of very good Fastness to Washing, Milling and Cross-Dyeing:</p> <p>Methyl Violet 6B—2B } aftertreated with tannin and antimony. Crystal Violet 10B }</p> <p>The dyestuffs enumerated in this column are all particularly well suited for tin-weighted silk.</p>

The dyestuffs marked with an asterisk (\*) are

# AND VIOLET ON SILK.

## Diamine Colours

### Red and Claret.

Of good Fastness to Water,  
Washing and Light:

- Diamine Purpurine B, 6B
- Diamine Brilliant Rubine S
- \*Diamine Bordeaux S
- \*Diamine Scarlet B, 3B
- \*Diamine Fast Scarlet SBN
- \*Diamine Fast Red F
- \*Diamine Brilliant Bordeaux R

Diamine Purpurine B and Diamine Fast Red F are particularly fast to water. By subsequent tanning, all Diamine Colours become faster to water. Diamine Fast Red F attains the same fastness also by being aftertreated with chromium fluoride.

Of very good Fastness to Water,  
Washing, Milling and Cross-Dyeing:

- \*Primuline, diazotised and developed with Beta Naphtol or Bordeaux Developer.

Diamine Azo	} diazotised and developed with Beta Naphtol
Scarlet A, B	
*Diamine Azo Bordeaux B	

Fast to Degumming:

- \*Primuline, diazotised and developed with Beta Naphtol.

particularly well suited for tin-weighted silk.

## Immedial Colours

### Violet.

Of excellent Fastness to Washing,  
Milling, Degumming and  
Cross-Dyeing:

- Immedial Indone Violet CR, CB
- Immedial Indone Violet B conc.

The fastness to light and degumming may be still enhanced by an aftertreatment with bichrome and copper sulphate (see page 227).

## Diamine Colours

### Violet.

Of good Fastness to Water and  
Washing:

- Oxy Diamine Violet B
- Diamine Heliotrope B, G

At the same time very Fast to Light:

- \*Diamine Violet N
- \*Diamine Fast Violet FFRN
- \*Diamine Fast Violet FFBN
- \*Diamine Fast Violet BBN

Diamine Violet N is the best for fastness to water. Subsequent tanning will increase the fastness of all Diamine Colours.

Of very good Fastness to Water,  
Washing and Milling:

- Diamine Azo Blue R, RR\*,  
diazotised and developed with Beta Naphtol.

Acid Colours

Bright Blues.

Of normal Fastness:

- \*Cyanole FF, extra
- \*†Tetra Cyanole extra,  
SF, V, A
- \*†Methyl Blue for silk
- \*†Blue PBS, BS, FS, RRS
- \*†Pure soluble Blue
- \*†Water Blue B, R

Of good Fastness to Water:

- \*Alkaline Blue, all brands
- \*Brilliant Milling Blue B
- \*Methyl Blue for silk  
(in light shades).

Of good Fastness to Washing  
and Milling:

All the afore-mentioned dyestuffs  
aftertreated with tannin and anti-  
mony, except Cyanole FF, extra,  
Tetra Cyanole extra, SF, V.

Of very good Fastness to Light:

- \*†Alizarine Cyanole EF, SR,  
SB, SG
- \*†Alizarine Cyanole B  
(for Light Blue).

Navies and Dark Blues.

Of normal Fastness:

- \*†Solid Blue R, 3R
- †Naphtol Blue G

Of very good Fastness to Light:

†Lanacyl Blue BN, RN

At the same time of good Fastness  
to Water, Washing and Milling:

- \*Alphanol Blue GN,  
BR extra, 5RN

shaded with  
Anthracite Black B, R.

The dyestuffs marked with a  
cross (†) become fast to water by  
an aftertreatment with tannin and  
antimony.

The dyestuffs marked with an asterisk (\*) are

Basic Colours

Bright Blues.

- New Methylene Blue GG, N,  
R, 3R
- Methylene Blue BB
- Victoria Blue B
- Silk Blue KA (chiefly for shading  
Logwood Black).

Of good Fastness to Water,

Washing, Milling and Cross-Dyeing:

- Victoria Blue B
- New Methylene Blue,  
all brands
- Methylene Blue BB

}  
aftertreated  
with tannin  
and antimony

Fast to Degumming:

- Victoria Blue B, aftertreated  
with tannin and antimony.

Navies and Dark Blues.

- Indazine M
- Naphtindone BB, BR.

Of good Fastness to Light, and very  
good Fastness to Water, Washing,

Milling and Cross-Dyeing:

The afore-mentioned dyestuffs  
aftertreated with tannin and anti-  
mony.

The dyestuffs enumerated in  
this column are all particularly well  
suited for tin-weighted silk.

# BLUE ON SILK.

## Diamine Colours

Of good Fastness to Water and Washing:

Diamine Sky Blue FF	} for bright Blues.
Diamine Blue RW, 2B,	
3B, 3R	
Diamine Brilliant Blue G	

\*Diamine Steel Blue L.

Very Fast also to Light:

*Diamine Fast Blue FFB	} after-treated with copper sulphate
*Diamine Dark Blue B	
Diamine Blue RW, 3R	
Diamine Sky Blue FF	
Diamine Brilliant Blue G	

Diamine Blue RW and Diamine Dark Blue B are of particularly good fastness to water. All the Diamine Colours become faster to water by subsequent tanning.

Of very good Fastness to Water, Washing and Milling:

Diamine Sky Blue, diazotised and developed with soda

\*Diamine Black BH  
(for Dark Blue).

Very Fast also to Light:

*Diaminogene Sky Blue N	} diazotised and developed with Beta Naphtol
*Diaminogene Blue BB, 3RN, 6RN	
*Diaminogene Dark Blue.	

Of very good Fastness to

Cross-Dyeing:

*Diaminogene Sky Blue N	} diazotised and developed with Beta Naphtol
*Diaminogene Blue 3RN, 6RN	

particularly well suited for tin weighted silk.

## Immedial Colours

Of excellent Fastness to Washing, Milling, Cross-Dyeing and

Degumming:

Bright Blues.

Immedial Indone	BBF conc.
"	" JBF conc.

Navies and Dark Blues.

Immedial Indone	BBF conc.
"	" JBF conc.
"	" R conc.
"	" RR conc.

The fastness to light and degumming may still be enhanced by an aftertreatment with bichrome and copper sulphate (see page 227).



Acid Colours

Of normal Fastness:

Combinations of

- \*†Cyanole Green B, 6G
- \*†Naphtol Dark Green G
- \*Indian Yellow FF
- \*Orange extra, EN
- \*†Tetra Cyanole V

For Bright Greens:

- \*†Acid Green extra conc.,  
extra conc. B
- \*†Brilliant Milling Green B
- \*†Fast Acid Green BN  
shaded with  
Naphtol Yellow S
- \*†Acid Yellow AT

Of better Fastness to Light:

- \*†Cyanole Fast Green G  
shaded with
- \*†Fast Acid Yellow TL
- \*†Acid Yellow AT  
(for full Yellows)
- \*Orange EN

- \*†Alizarine Cyanole SR

Excellently Fast to Light:

- †Naphtol Green B
- \*†Alizarine Brilliant Green G  
shaded with
- \*Fast Acid Yellow 3G
- †Milling Yellow O
- \*Orange GG, EN
- \*†Alizarine Cyanole EF, SR

Of good Fastness to Washing and

Milling:

- \*†Brilliant Milling Green B
- \*†Naphtol Dark Green G
- \*†Alizarine Brilliant Green G  
(excellently fast to light)  
shaded with
- \*†Milling Yellow O

The dyestuff marked with a cross (†) become fast to water by an aftertreatment with tannin and antimony.

Basic Colours

Combinations of

- Solid Green Crystals O
- Brilliant Green Crystals extra
- Diamond Phosphine GG, R
- Paraphosphine GG, G, R
- Chrysoïdine AG
- Bismarck Brown EE
- Methylene Blue BB

For Bright Greens:

- Solid Green Crystals O
- Brilliant Green Crystals extra  
shaded with
- Thioflavine TCN

Of good Fastness to Water,

Washing, Milling and Cross-Dyeing:

Combinations of

- Brilliant Green Crystals  
extra
- Diamond Phosphine  
GG, R
- Thioflavine TCN
- Irisamine G
- Methylene Blue BB

aftertreated  
with tannin and  
antimony

The dyestuffs enumerated in this column are all particularly well suited for tin-weighted silk.

The dyestuffs marked with an asterisk (\*) are



# AND OLIVE ON SILK.

## Diamine Colours

Of good Fastness to Water and  
Washing:

Combinations of

- \*Diamine Green FG
- Thioflavine S
- \*Diamine Yellow CP
- \*Oxy Diamine Orange G, R

Very Fast also to Light:

Combinations of

- \*Diamine Green CL, G
- \*Diamine Dark Green N
- \*Diamine Yellow CP
- \*Diamine Fast Yellow FF
- Diamine Orange F\*, D.

Of very good Fastness to Water,  
Washing and Milling:

Combinations of

- Diamine Green G
- Diamine Fast Yellow FF
- Diamineral Brown G
- Diamine Catechine G,
- Diamine Dark Blue B

3G

} aftertreated with  
chromiumfluoride

further:

- \*Diamine Nitrazol Green
- GF, BB
- shaded with
- \*Diamine Fast Yellow A
- \*Diamine Nitrazol
- Brown GF

} coupled with  
Nitrazol C

The coupled shades are also of  
good fastness to cross-dyeing.

particularly well suited for tin-weighted silk.

## Immedial Colours

Of excellent Fastness to Washing,  
Milling, Cross-dyeing and

Degumming:

- Immedial Brilliant Green
- G extra
- Immedial Green GG extra,
- BB extra
- Immedial Deep Green G
- Immedial Dark Green B
- Immedial Olive GG
- Immedial Yellow Olive 5G

shaded with

- Immedial Yellow D
- Immedial Cutch O.

For Brighter Greens:

- Immedial Brilliant Green
- G extra
- Immedial Green GG extra,
- BB extra
- shaded with
- Immedial Yellow GG.

The fastness to light and de-  
gumming of these products may  
still be enhanced by an aftertreat-  
ment with bichrome and copper  
sulphate (see page 227).

Acid Colours

Basic Colours

Of very good Fastness to Light:

Bluish Blacks.

- \*Silk Black DB
- \*Naphtylamine Black 4B, 6B
- \*Naphtol Blue Black (in the case of a pronounced greenish cast)

More covered Blacks.

- \*Naphtylamine Black X3B
- Neutral Wool Black G  
saddened with
- \*Indian Yellow FF
- \*Orange EN.

Of good Fastness to Water and

Washing and also very good

Fastness to Light:

- \*Alphanol Black BG, 3BN, KBB, KV, KWAN conc.
- \*Naphtyl Blue Black FBB  
for more covered Blacks  
shaded with
- \*Milling Yellow O
- \*Alphanol Brown B.

The fastness to water and washing may be increased by after-treating with tannin and antimony.

Of very good Fastness to Water,

Washing, Milling and Light:

- Anthracite Black R, B  
shaded with
- \*Milling Yellow O
- \*Anthracene Yellow BN  
(after-chromed)

if necessary, tanned subsequently, in order to enhance the fastness to washing and milling

Bluish Blacks.

- \*Black for Artificial Silk BN
- \* " " " " GN  
shaded with
- \*Methylene Blue BB
- \*Naphtindone BB.

More covered Blacks.

- \*Black for Artificial Silk TN  
shaded with
- \*Diamond Phosphine GG, R.

Of very good Fastness to Water

and Washing, and good Fastness

to Milling and Cross-Dyeing:

The afore-mentioned dyestuffs, aftertreated with tannin and antimony.

The dyestuffs marked with an asterisk (\*) are

# BLACK ON SILK.

## Diamine Colours

Of very good Fastness to Water,  
Washing, Milling, Light and Cross-

### Dyeing:

#### Bluish Blacks.

\*Diaminogene extra, diazotised  
and developed with Resorcine or  
Phenylene Diamine (excellently  
fast to light).

\*Diaminogene B, diazotised and  
developed with Beta Naphtol or  
Resorcine.

#### More covered Blacks.

\*Diaminogene B, diazotised and  
developed with Phenylene  
Diamine.

#### For Blue-Black.

\*Diaminogene extra, diazotised  
and developed with Beta Naphtol  
(excellently fast to light).

For Cheaper Blacks, not quite so

### Fast to Light:

\*Diamine Black BH, diazotised  
and developed with Beta Naphtol  
or Resorcine for Blue-Black;  
with Phenylene Diamine for  
Deep Black.

particularly well suited for tin-weighted silk.

## Immedial Colours

Of Excellent Fastness to Washing,  
Milling, Light, Cross-Dyeing and

### Degumming:

#### Bluish Blacks.

Immedial Black BF conc.

„ „ BZ conc.

shaded with

Immedial Indone BBF conc.

Immedial Green BB extra.

#### More covered Blacks.

Immedial Black AZ

shaded with

Immedial Deep Green G.

The fastness to light and de-  
gumming may be still enhanced by  
aftertreating with bichrome and  
copper sulphate (see page 227).

## Dyestuffs for Silk Fast to Stoving.

The following dyestuff possess very good fastness to stoving:

- \*†Fast Acid Yellow TL, 3G
- \*†Acid Yellow AT
- Milling Yellow O
- \*†Naphtol Yellow S
- \*†Indian Yellow, all brands
- \*†Orange GG, extra, EN
- Alphanol Brown B
- \*†Brilliant Cochineal 2R, 4R
- \*†Brilliant Scarlet GG, R
- \*†Azo Orseille BB
- \*†Lanafuchsine 6B
- \*†Brilliant Lanafuchsine, all brands
- \*†Azo Rubine A
- \*†Azo Red A
- \*†Rosazeïne B
- \*†Eosine                    } all brands
- \*†Erythrosine            }
- \*†Phloxine
- \*†Rose Bengale extra N
- †Formyl Violet 4BF, S4B
- \*†Acid Violet 6BS, 6BC
- \*†Azo Wool Violet 7R
- \*†Alizarine Cyanole Violet R
- \*†Cyanole Fast Green G
- \*†Brilliant Milling Green B
- \*†Cyanole Green B, 6G
- †Alizarine Brilliant Green G } when subsequently tanned
- †Naphtol Dark Green G       } also fast to stoving next
- } to silk.
- \*†Cyanole FF, extra
- \*†Tetra Cyanole V, SF, extra
- †Tetra Cyanole A
- \*†Alizarine Cyanole, all brands.

The dyestuffs marked with an asterisk (\*) have a tendency to stain adjacent stoved wool more or less, the dyestuffs marked with a cross (†) to stain adjacent stoved silk.

†Brilliant Milling Blue B, if subsequently tanned also fast  
to stoving next to silk

†Formyl Blue B

\*†Solid Blue R, 3R

\*†Naphtol Blue G

\*†Induline B

\*†Silver Grey N

\*†Nigrosine Soluble in Water  
Anthracite Black R, B

\*†Thioflavine T, TCN

†Diamond Phosphine GG, R

Paraphosphine G\*†, GG†, R†

\*†Safranine, all brands

†Irisamine G

†Rosazeine 6G

\*†Methyl Violet 6B—2B

\*†Crystal Violet 10B

\*†New Methylene Blue N

†Victoria Blue B

If subsequently tanned also  
fast to stoving next to wool  
and silk, with the exception  
of Methyl Violet which is  
fast to stoving only next to  
wool.

Thioflavine S

Diamine Fast Yellow FF, A

Diamine Yellow CP

Diamine Orange G, D, F

Oxy Diamine Orange G

Diamine Brown M, B

Diamineral Brown G

Diamine Fast Brown G, R, GB

Diamine Purpurine B, 6B

Diamine Fast Red F

Diamine Rose GD, BD, FFB

Diamine Fast Scarlet 8BN

Diamine Brilliant Bordeaux R

Diamine Brilliant Rubine S

Diamine Violet N

Oxy Diamine Violet B

Diamine Heliotrope B, G

Diamine Sky Blue FF

Diamine Blue, all brands

Diamine Fast Blue FFB

Diamine Brilliant Blue G

Diamine Dark Blue B

Diamine Steel Blue L

Diamine Green, all brands

Diamine Dark Green N

Diamine Black HW

Primuline, diazotised and developed with soda, Resorcine or  
Beta Naphtol

Diamine Azo Bordeaux B } diazotised and developed  
Diamine Azo Scarlet A, B } with Beta Naphtol

Diamine Orange D, diazotised and developed with sulphuric  
acid

Diamine Brown M, S, diazotised and developed with Beta  
Naphtol or Phenylene Diamine

Diamine Sky Blue, diazotised and developed with soda

Diaminogene Sky Blue N

Diaminogene Blue 3RN, 6RN } diazotised and developed  
Diamine Azo Blue RR, R } with Beta Naphtol  
Diamine Blue BB

Diamine Black BH, diazotised and developed with Beta  
Naphtol or Resorcine

Diaminogene extra, B, diazotised and developed with Beta  
Naphtol, Resorcine or Phenylene Diamine

Diamine Fast Yellow A } coupled with  
Diamine Nitrazol Bordeaux BL } Nitrazol C

Anthracene Acid Brown R, N, V, B } after-chromed or on  
Anthracene Acid Black DSN } a chrome mordant

Immedial Yellow GG, D

Immedial Yellow Olive 5G

Immedial Olive GG

Immedial Cutch O, OG, OR

Immedial Brown BR

Immedial Dark Brown D conc.

Immedial Violet CR, CB

Immedial Indone Violet B conc.

Immedial Indone BBF conc., JBF conc.

Fairly fast to stoving and satisfactory for most cases  
the following:

\*†Brilliant Scarlet R, 6R

\*†Crystal Scarlet 6R

\*†Brilliant Croceine R

\*†Roccelline

†Formyl Violet 6B, 8B, 10B

†Naphtol Green B

Anthracite Black B

\*†Tannin Heliotrope } if subsequently tanned satisfactory also  
†Indazine M } next to wool and silk.

Oxy Diamine Orange R  
 Diamine Brown 3G  
 Diamine Scarlet 3B  
 Diamine Fast Violet FFBN, FFRN  
 Diamine Cutch, diazotised and developed with sulphuric  
 acid or soda  
 Diaminogene Blue BB } diazotised and developed  
 Diaminogene Dark Blue } with Beta Naphtol  
 Anthracene Yellow BN, C } subsequently tanned or  
 Anthracene Acid Brown G } on a chrome mordant.  
 Immedial Bordeaux GF conc.  
 Immedial Prune S  
 Immedial Indone RR conc., R conc.  
 Immedial Green BB extra, GG extra  
 Immedial Brilliant Green G extra  
 Immedial Black NNG conc.

### Dyestuffs resisting the Bleaching with Peroxides of Hydrogen or Sodium.

For silk shot effects which, interwoven with wool, silk or cotton, have to withstand the bleaching of the goods with hydrogen or sodium peroxide, the following dyestuffs are best suited:

Brilliant Milling Green B	}	aftertreated with tannin and antimony
Brilliant Milling Blue B		
Victoria Blue B		
Methylene Blue BB		
Indazine M		
Naphtindone BB		
Crystal Violet 10B		
Rosazeïne 6G		
Primuline, diazotised and developed with soda, Beta Naphtol or Bordeaux Developer		
Diamine Blue BB, diazotised and developed with Alpha Naphtol		
Immedial Yellow GG		
Immedial Orange C		
Immedial Black BF conc. (without iron bottoming).		

## B. SILK DYEING IN THE PIECE.

Light qualities, principally such as foulard, pongée, satin and so on, are dyed in the piece.

The materials are first singed on both sides with the gas- or plate-singing machine, and hereafter de-gummed like hank silk in the vat with the addition of 1 lb olive-oil soap per 10 gallons soft water, boiling hot, either once or twice, according to requirement. The degumming may be done in the ordinary winch-vat, but may be effected to better advantage on the well-known star-frames.

The degummed pieces are first of all rinsed thoroughly in a lukewarm bath charged with a little soda, and thereupon in a fresh soft water bath; they are then ready for dyeing, provided that they have not to be bleached first, or that a weighting with stannous chloride according to the well-known process has not to take place first, which method has of late been adopted for piece-goods also.

The bleaching is effected either according to the methods given on page 214 for hank silk by means of peroxide of hydrogen or sodium or in the stoving chamber. The most suitable dyevat for the purpose is an ordinary wooden or copper vat provided to advantage with a perforated false bottom and with a winch over which the goods are allowed to run in the rope.

For the dyeing of silk piece-goods, Acid and Diamine Colours are principally used; for full shades on weighted silk on the other hand, Basic Colours are likewise used. For this purpose, the same dyestuffs and methods are applied as given under (A) for hank-silk; for particulars see therefore the full details given in the chapter on hank-silk dyeing. The only difference in the dyebaths is that in the case of piece-goods the dyeing is done in a slightly acidulated bath without the addition of boiled-off liquor.

We would also point out that the Diamine Colours have been found especially well suited for the production of dyeings on umbrella and blouse material and for the Hyraldite discharge styles fast to water and washing.

## C. DYEING OF BOURETTE SILK (WASTE SILK).

Bourette silk is dyed in the form of Bourette yarn, loose material and noils. The material does not require to be degummed; previous to dyeing it is cleaned in a



bath of 60—70° C. (140—160° F.) with the addition of 4—5% soda ash or ammonia; in the case of bright shades it may also soaped hot, bleached and rinsed well.

The dyestuffs for dyeing this kind of silk are the same as indicated for thrown silk under (A) "Silk Dyeing in the Hank", and the methods of dyeing are likewise the same. For cheap dyeings not requiring any special properties of fastness, Basic and Acid Colours are principally used. For dyeings which are expected to be fast to washing next to wool, the Diamine Colours dyed direct will be found sufficient, and for very bright tones the Basic Colours, subsequently tanned, will in most cases suffice; for dyeings of best possible fastness to milling and acid boiling, on the other hand, the Diamine Colours will come into consideration, either diazotised and developed, coupled with Nitrazol or after-chromed, also the Anthracene Colours, after-chromed, and Basic Colours, subsequently tanned, the latter for particularly bright shades.

Bourette yarn is dyed in the vat in exactly the same way as hank-silk; for loose Bourette or noils the vat is likewise used, which to best advantage is provided with a perforated false bottom, or the customary copper tank may be used. Dye in a gently boiling bath with 10% Glauber's salt crystals and the addition of either 5—10% bisulphate of soda or 2—4% sulphuric acid, or of 2—5% acetic acid, according to the dyestuff used and to the depth of shade, a little acid being subsequently added if necessary in order to exhaust the bath. Light shades are dyed with Diamine Colours, the only ingredient being Glauber's salt; the bath may be exhausted with a little acetic acid.

## D. DYEING OF TUSSAH SILK.

Tussah silk (also called tussur or natural silk) is dyed either in the hank or in the piece, less frequently in the loose state; the same dyestuffs and methods are applied as for thrown silk (see Sections A and B). The baths have to be charged with a somewhat larger quantity of dyestuff, more being required for Tussah silk than for thrown silk; the dyeing in the boiled-off liquor is likewise omitted as a rule, the dyeing being done with the addition of acid and 10% Glauber's salt crystals, or of acid only.

For cheap dyeings in the hank without any special requirements for fastness, Basic Colours are frequently

used; for dyeings fast to light (fringes, trimmings etc. as well as dress material and plush), Acid Colours are generally used. For loose Tussah silk, Diamine Colours dyed direct are used, and for dyeings of particularly good fastness to milling and cross-dyeing, Diamine Colours diazotised and developed, coupled or after-chromed.

For *Blacks*, Naphtylamine 4B, X3B and Neutral Wool Black G are especially well suited, shaded with Indian Yellow or Naphtol Dark Green G according to requirement; for piece-goods, Neutral Wool Black G in combination with Naphtol Dark Green G has been found very serviceable.

Before dyeing, the Tussah silk should be boiled off well; in the case of very bright shades, it requires to be bleached. Soak the material in hot water, work for one hour in a boiling hot bath charged with 6—8 oz soda ash per 10 gallons, rinse well, and soap boiling hot for  $\frac{1}{2}$  hour with 6 oz olive-oil soap per 10 gallons. Hereafter wash thoroughly, first in lukewarm water charged with a little soda, and then in plain water. For deep shades and Blacks, the soaping may generally be omitted.

The bleaching is done with either hydrogen or sodium peroxide as indicated for silk on page 214. For Tussah silk intended for White, the bleaching baths should be stronger; in such a case the following method is applied:

Charge the short, cold bath with

10 gallons water  
3—  $4\frac{1}{2}$  „ hydrogen peroxide and enough  
silicate of soda to cause a  
weakly alkaline reaction,

or with 10 gallons water  
2 lbs 12 oz to 4 lbs sulphuric acid 170° Tw.  
2— 3 lbs sodium peroxide.

Scatter the sodium peroxide slowly into the bath charged with acid whilst stirring, and then add some silicate as in the case of hydrogen peroxide. Add  $\frac{1}{2}$ —1 lb olive-oil soap per 10 gallons, enter the silk at 40—50° C. (105—120° F.), raise within an hour to boiling heat and treat for about 8 hours. Every two hours the bath is brought again to the boil; when it no longer shows an alkaline reaction, a little silicate will have to be carefully added. Hereafter rinse, soap boiling hot with 10% olive-oil soap, then add either a little Methyl Violet, Crystal Violet or Victoria Blue B to the cold soap bath for blueing, stove in the stoving chamber, rinse, and scroop.

UNION DYEING.

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# DYEING OF UNIONS

## IN THE PIECE, IN HANKS AND IN THE LOOSE MATERIAL.

Unions are dyed either

- A. By the One-Bath Method with Diamine Colours and Wool Colours together in one and the same bath, or
- B. By the Two-Bath Method in *two* (or more) baths; in the latter case either the wool is dyed first and then the cotton, or vice versa the wool after the cotton.

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### A. Dyeing by the One-Bath Method.

This is carried out either  
*in a neutral bath* or  
*in a weakly acid bath.*

In both cases the dyeing is done in a wooden vat of the well-known make provided with a winch. For the heating, it is best to use indirect steam, because open steam dilutes the liquor too much. If vats are employed which have been previously used for acid-dyeing, they must be first thoroughly boiled out with soda in order to neutralise the acid absorbed by the wood.

#### 1. Dyeing in a Neutral Bath.

While the Union and Union Fast Colours dye cotton and wool practically the same shade in a neutral bath, the Diamine Colours have to be classified according to the following groups depending on their behaviour towards the animal and vegetable fibre in a neutral bath:

- 1. Diamine Colours which dye cotton and wool practically the same shade and depth;
- 2. Diamine Colours which dye the cotton deeper than the wool;
- 3. Diamine Colours which dye the wool deeper than the cotton.

A further group to be considered is

- 4. Wool Colours which go on to wool in a neutral Glauber's salt bath, and which are used for shading the wool in order to bring it to the same shade and depth as the cotton.

1. Diamine, Union and Union Fast Colours which dye wool and cotton practically the same shade.

Thioflavine S  
 Oxy Diamine Yellow GG, TZ, CR  
 Diamine Fast Yellow FF, B, M, 3G, FR  
 Union Fast Yellow G  
 Diamine Orange B  
 Oxy Diamine Orange G, R  
 Union Fast Orange G, R  
 Diamine Rose GD, BG, FFB  
 Diamine Red 4B, 5B, 6B, 10B, D, DN  
 Cotton Red A  
 Diamine Purpurine B, 3B, 6B, V  
 Diamine Fast Red F, 8BL  
 Union Fast Red R, 3581J  
 Union Fast Bordeaux FR  
 Union Fast Heliotrope B  
 Diamine Brilliant Bordeaux R  
 Diamine Bordeaux VRO  
 Diamine Brown 3G, R, M, MR, MRD, S, SD, BWA, GWA, No 30a, 33, 37, 40, 42a, 43  
 Diamine Violet 2204J, 2205J  
 Oxy Diamine Brown G, 3GN  
 Union Fast Brown R, RD, G  
 Diamineral Brown G  
 Diamine Catechine G, 3G  
 Union Brown TD, 1926J, 2089J, 2571J, 3493J, 4221J, 4354J  
 Union Dark Brown A  
 Diamine Blue RW  
 Diamine Bengal Blue G  
 Diamine Azo Blue 6B  
 Diamine Steel Blue L, 2206J

2. Diamine Colours which dye cotton deeper than wool.

\*Diamine Fast Yellow  
A, AGG, AR  
\*Diamine Orange G, D  
Diamine Fast Orange EG, ER  
Direct Rose T  
Diamine Fast Scarlet \*GG,  
GFF, 4BFF, 4BFS, 5BFF,  
7BFF, 8BN, \*8BF, \*10BF  
\*Diamine Brilliant Rubine S  
Diamine Bordeaux B  
Oxy Diamine Violet  
B, G, R, \*BF  
Diamine Heliotrope B, G, O  
Diamine Violet N, BB. RB  
\*Diamine Nitrazol Brown G  
Diamine Brown ATC  
Diamine Catechine B  
Diamine Fast Brown G, R, BG  
\*Oxy Diamine Brown RN  
Diamine Sky Blue, FF, FFS,  
FFN  
Diamine Pure Blue A  
\*Diamine Fast Blue  
FFB, FFG, G, BN  
Oxy Diamine Blue G, 3G, 5G,  
B, R, PG, PB, PR  
Diamine Blue BB, 3B, BG,  
NC, No. 51, 53, 54, 56  
Diamine Bengal Blue R  
Diamine New Blue G, R  
Diamine Brilliant Blue G

The dyestuffs marked with an asterisk (\*) stain wool but slightly even when subjected to continuous boiling.

Continuation on page 250.

# ONE-BATH DYEING OF UNION GOODS.

## 3. Diamine Colours which dye wool deeper than cotton.

Diamine Gold  
 Diamine Yellow CP  
 Diamine Orange F  
 Diamine Red 101J  
 Diamine Violet Red  
 Diamine Rose BD  
 Diamine Scarlet B, 3B  
 Diamine Bordeaux S  
 Diamine Fast Bordeaux 6BS  
 Diamine Brown B  
 Cotton Brown A, N  
 Diaminogene extra  
 Diamine Jet Black OO  
 Diamine Fast Grey BN, RN  
 Diamine Black DB

## 4. Wool Colours (Acid Colours) which go on to wool in a neutral Glauber's salt bath and are used for shading wool.

Naphtaline Yellow Crystals  
 Indian Yellow G, R, FF  
 Fast Acid Yellow 3G  
 Tropaeoline G, OO  
 Orange II, extra, ENZ, R  
 Azo Red A  
 Croceïne AZ  
 Roccelline  
 Wool Red B, BG  
 Milling Red G  
 Rosazeïne B, 13  
 Irisamine G  
 Alkaline Blue 6B—3R  
 Formyl Blue B  
 Brilliant Milling Blue B  
 Brilliant Wool Blue RB  
 Tetra Cyanole A  
 Thiocarmine R  
 Alizarine Cyanole B  
 Lanacyl Blue BB, R, BN, RN  
 Lanacyl Navy Blue B, BB  
 Alphanol Blue BR extra,  
 GN, 5RN  
 Naphtol Blue G, R  
 Formyl Violet 10B, 8B, 6B,  
 4BF, S4B, S5B, HW  
 Alkaline Violet CA, C  
 Lanacyl Violet B, BF  
 Alizarine Cyanole Violet R

Continuation page 251.

1. Diamine, Union and Union Fast Colours which dye wool and cotton practically the same shade.

2. Diamine Colours which dye cotton deeper than wool.

(Continued from page 248).

(Continued from page 248).

Union Blue BJ, RJ, BB,  
OHDF, K3B, 2472J, 761J,  
806J, 3888J, 4036J, 4083J  
Union Fast Blue F, FR, F3R  
Union Fast Dark Blue B, R  
Union Navy Blue 780J  
Diaminogene B  
Direct Grey 2207J  
Union Fast Grey G, BR  
Diamine Green G, B, CL, BO,  
FG  
Diamine Nitrazol Green S  
Union Green 2341J, 3640J,  
3446J, 4419J, 4481J  
Diamine Green 2209J, 2210J  
Diamine Dark Green N  
Union Fast Green GG, BB  
Diamine Black IIW  
Oxy Diamine Black JE, JEL,  
JW, JWF, JWB extra conc.,  
JWN extra conc., FFC, UI,  
S000  
Union Black S, P, BG, KD,  
BB, 3B, OJGJ, 1993J, 3955J  
Union Jet Black B, GB  
Union Fast Black J, SB  
Special Black KMS  
Universal Black KB

Diamineral Blue \*R, CV, CVB,  
3RC, 3B, B, \*BF  
Diamine Deep Blue B, \*R  
Diamine Dark Blue B  
Diamine Black BH, BHF,  
BHN, BHR, RMW  
Diamine Fast Black F, X,  
XN extra conc., C high conc.,  
CB high conc.  
\*Union Dark Blue KN  
Oxy Diamine Black A, D, SA,  
US, BM  
Para Diamine Black B, BB,  
FFB, BF extra conc.,  
FF extra conc.  
Diamine Jet Black Cr, RB,  
SS  
Garment Black KP  
Diamine Aldehyde Black  
B conc., BB conc.

The dyestuffs marked with an asterisk (\*) stain the wool but slightly even when subjected to continuous boiling.



# ONE-BATH DYEING OF UNION GOODS.

3. Diamine Colours which dye wool deeper than cotton.

See page 249.

4. Wool Colours (Acid Colours) which go on to wool in a neutral Glauber's salt bath and are used for shading the wool.

(Continued from page 249).

Brilliant Milling Green B  
 Naphtol Dark Green G  
 Alizarine Brilliant Green G  
 Naphtol Blue Black  
 Naphtylamine Black 6B, 4B,  
 4BN, X2B, X3B, D, BB,  
 BBN, BBV, 3BV, R, RNB,  
 HWN, NBB  
 Naphtyl Blue Black N, FB,  
 FBB  
 Neutral Wool Black G, B, 4B  
 Alphanol Black BG, R, 3BN.

5. Diamine Colours which at a moderate temperature (about 50° C) (120° F) almost exclusively dye the cotton, and may be used for shading in a warm dyebath.

Diamine Fast Yellow A, AR,  
 AGG, B, FF  
 Diamine Fast Orange EG, ER  
 Diamine Orange G, D  
 Diamine Rose GD  
 Direct Rose T  
 Diamine Purpurine 6B  
 Diamine Fast Scarlet GG,  
 GFF, 4BFF, 4BFS, 5BFF,  
 7BFF, 8BN, 8BF, 10BF  
 Diamine Brilliant Rubine S  
 Diamine Fast Brown G, R, GB  
 Diamine Nitrazol Brown G  
 Diamine Brown S  
 Diamine Catechine B  
 Oxy Diamine Brown RN  
 Diamine Heliotrope B, G, O

Oxy Diamine Violet B, BF  
 Diamine Sky Blue, FF,  
 FFS, FFN  
 Diamine Pure Blue A  
 Diamine Blue NC  
 Diamine Fast Blue G, FFB,  
 FFG, BN  
 Diamineral Blue R, B, BF,  
 CV, CVB  
 Diamine Deep Blue R, B  
 Diamine Dark Blue B  
 Diamine Black BH, BHT,  
 BHN, BHR, RMW  
 Diamine Jet Black SS, RB, Cr  
 Oxy Diamine Black A, D, SA,  
 US, NF  
 Para Diamine Black B, BB,  
 FFB, BF extra conc.  
 Diamine Milling Black B conc.,  
 FG extra, FFB extra conc.

*With reference to the foregoing tables it has to be taken into consideration that the staining of the wool and the cotton is regulated principally by the temperature of the dyebath and the amount of salt added, being dependent also on the affinity of the material to the dyestuffs. The general rule is that a high temperature is favourable to dyeing the wool, whereas the dyestuffs go more on to the cotton at a lower temperature.*

#### Dyeing Directions for Neutral One-Bath Dyeing.

*For deep shades* the liquor should be as concentrated as possible (25 to 30 times the weight of the goods to be dyed), 2—4 lbs Glauber's salt crystals per 10 gallons liquor being added. The bath is first boiled up, and after shutting off steam the goods are entered, run for 20 to 30 minutes without steam, and boiled for  $\frac{1}{2}$  hour. The dyeings are then sampled to see whether they are up to shade or not; if the desired shade is not yet obtained and the wool and cotton are both still too pale, the requisite quantity of dyestuff is added to the liquor and the bath brought again to the boil, the goods being then worked for another  $\frac{1}{4}$  to  $\frac{1}{2}$  hour. If the wool is still too light, dyeing is continued at the simmer, after adding a small quantity of wool dyestuff, until the desired depth of shade is obtained. If on the other hand the cotton only be lacking in depth of shade, the goods are simply left to feed in the cooling bath, such dyestuffs as dye the cotton deeper (Group 2) being added according to requirement.

*For light shades* it is recommended to apply a different method, the well wetted-out goods being entered at 50° C. (120° F.) into the bath charged with  $\frac{1}{2}$ —1 lb Glauber's salt per 10 gallons liquor, raising the temperature gradually to the boil, boiling for 20 to 30 minutes, and sampling. If the wool is dyed sufficiently deep and the cotton is deficient in this respect, some of the requisite cotton dyestuff is added, the goods being worked in the cooling bath, whilst some of the wool dyestuff is added and the dyeing continued near boiling temperature if the wool has not assumed the desired depth of shade.

When dyeing pale shades, the dyebaths become almost completely exhausted; in the case of medium and dark shades on the other hand a portion of the dyestuff remains in the bath, which is preserved for subsequent lots.

It is recommended to keep separate vats for dyeing pale shades, brown, olive and similar shades, and others again for blacks and deep blues; if however there be reasons against keeping standing baths for the chief standard shades, the same liquor may be used repeatedly in a suitable rotation.

The amounts of dyestuff required for dyeing medium or dark shades in a standing bath are about  $\frac{3}{4}$ — $\frac{4}{5}$  of those used at first; the additions are dependent on the depth of shade, volume of liquor, and loss of liquor ensuing each time when lifting the goods. Thus the actual quantity required can only be determined exactly after dyeing the second or third batch.

Of Glauber's salt it is as a rule not necessary to add any more than one-fifth of the original quantity for subsequent lots, but the quantity may also be gauged according to the volume of water required for replenishing the liquor, as for instance, about 2—4 lbs Glauber's salt crystals per 10 gallons water in the case of deep shades. Very deep dyeings such as claret, dark brown, dark blue and black should be thoroughly rinsed after dyeing, as they are otherwise apt to bronze during the drying.

As far as the dyestuffs used permit, it is advisable, after the rinsing of the dyed goods, to sour off lightly with acetic acid.

Care should be taken when dyeing deep shades not to dry at too high a temperature, which is conducive to bronzing. Bronzy dyeings may easily be improved or corrected by rinsing subsequently in tepid water to which a little soap or tannin may if necessary be added.

## 2. Dyeing in a Weakly Acid Bath.

One-bath dyeing in a weakly acid bath imparts a better handle to union goods than is ensured in a neutral Glauber's salt bath, and is applied in order both to obtain a good handle and to impart a lustre to goods the wool portion of which has to remain as lustrous as possible, particularly in the case of goods like mohair, sealskin plush, garments which are being re-dyed, etc.

### Dyeing with Diamine Colours and Wool Colours.

Prepare the bath with Glauber's salt and a little acetic acid, or, better still, with salammoniac (ammonium chloride) or sulphate or acetate of ammonia instead of acetic acid.

The Diamine Colours go better on to the wool in an acid than in a neutral bath, and there are only certain Diamine Colours therefore which can be dyed acid on unions.

### Dyeing Directions for Diamine Colours and Wool Colours in a Weakly Acid Bath.

Dye in a short bath as indicated for neutral one-bath dyeing on page 252, with the addition of the usual amount of Glauber's salt, adding at the same time 3—5% salammoniac or 1—3% acetic acid 30%; enter the goods into the lukewarm bath, gradually raise the temperature to near boiling point, and dye in the first place for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour without boiling up. If the wool is not dark enough by this time, boil gently for a little while according to requirement,  $\frac{1}{4}$  to  $\frac{1}{2}$  hour being as a rule sufficient.

Besides Glauber's salt and acetic acid,  $\frac{1}{4}$ — $\frac{1}{2}$ % bichrome may likewise be added. This method, however, is suited for certain dyestuffs only, and is applied only in special cases. See table on page 257.

## Diamine Colours for the Dyeing of Unions in a Weakly Acid Bath.

Thioflavine S	Diamine Fast Brilliant Blue
Oxy Diamine Yellow TZ, CR	R
Diamine Fast Yellow A,	Diamine Azo Blue R
AGG, B, FF, M, FR	Diamine Deep Blue B, R
Diamine Orange G, D, B	Union Fast Blue F, FR,
Diamine Fast Orange EG,	F3R
ER	Union Fast Green GG, BB
Union Fast Orange G, R	Diamine Violet N
Diamine Brown 3G, M, MR,	Oxy Diamine Violet BF, B,
R, S, ATC	R, G
Diamine Fast Brown G, R	Diamine Heliotrope G, B, O
Diamine Nitrazol Brown G	Union Fast Heliotrope B
Diamine Bronze Brown PE	Diamine Fast Black F, X,
Diamine Catechine G, 3G	XN extra conc.,
Union Fast Brown R, G, RD	CB high conc., C high conc.
Diamine Red 4B, 10B	Diamine Azo Black B
Diamine Purpurine B, 3B,	Diamine Black BH, BHF,
6B	BHN, HW, DB, DN
Diamine Rose GD, BD, FFB	Oxy Diamine Black JE,
Direct Rose T	JEI, JB, JW, JWF, SOOO
Diamine Bordeaux B, S	Para Diamine Black B, BB,
Diamine Brill. Bordeaux R	FFB, BF extra conc.
Diamine Fast Scarlet,	Oxy Diaminogene FFN,
all brands	FFG, ED, EF, OB, OT
Diamine Brilliant Rubine S	Union Black KD, BB, 3B
Union Fast Red R	Union Jet Black GB
Union Fast Bordeaux FR	Union Fast Grey G, BR.
Diamine Sky Blue,	
all brands	
Diamine Pure Blue A	
Diamine Dark Blue B	
Oxy Diamine Blue 5G, 3G,	
G, B, PG, PB	
Diamine New Blue G, R	
Diamine Bengal Blue G, R	
Diamine Blue 3B, NC	
Diamine Brilliant Blue G	
Diamineral Blue R, B, BF,	
3B, CV, CVB	
Diamine Fast Blue FFB,	
FFG, G, BN	

### Wool Colours for Shading Unions in a Weakly Acid Bath.

### Acid Colours.

The dyestuffs enumerated in column 4 on pages 249 and 251

and further:

Alizarine Cyanole EF.

### Chrome Colours.

Anthracene	Yellow BN
Anthracene	Acid Brown
	G, R, N
Anthracene	Chromate Brown
	3G, WG, WS, EB, ER
Anthracene	Chromate
	Blue XR
Anthracene	Chromate
	Violet XB
Anthracene	Chromate
	Green B
Anthracene	Chromate
	Grey G

When applying these dyestuffs, which are used for producing dyeings of good fastness to light and at the same time fast to washing, add 1% bichrome after the dyeing, treat once more for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour at the simmer, and then rinse thoroughly.

**Dyestuffs for One-Bath Dyeing of Unions in a Weakly Acid Bath with the Addition of Bichrome.**

**Diamine Colours.**

Diamine Fast Yellow  
     A, B, FF, AGG  
 Oxy Diamine Yellow CR  
 Diamine Orange D, G  
 Diamine Fast Orange  
     EG, ER  
 Diamine Brown ATC, M  
 Diamine Fast Brown  
     R, G, GB  
 Diamineral Brown G  
 Diamine Red 4B  
 Direct Rose T  
 Diamine Fast Scarlet 4BN,  
     6BS, 6BGN, 8BF, 10BF, GG  
 Diamine Purpurine B, 3B, 6B  
 Diamine Bordeaux B  
 Diamine Brilliant  
     Bordeaux R  
 Diamine Brilliant Rubine S  
 Diamine Heliotrope B  
 Diamine Violet N  
 Oxy Diamine Violet BF  
 Diamine Steel Blue L  
 Diamine Sky Blue FF  
 Diamine Bengal Blue G  
 Oxy Diamine Blue 5G, G  
 Diamineral Blue  
     BF, CV, CVB  
 Diamine Brilliant Blue G  
 Diamine Dark Blue B, R  
 Diamine Blue NC, RW  
 Diamine Fast Blue FFB, FFG  
 Diamine Black BH, BHF,  
     HW  
 Oxy Diamine Black JW,  
     JWB extra conc.,  
     JWN extra conc.  
 Oxy Diaminogene OB.

**Wool Colours.**

Milling Yellow O  
 Milling Red G  
 Wool Red B, BG  
 Tetra Cyanole A  
 Brilliant Milling Green B  
 Brilliant Milling Blue G  
 Formyl Blue B  
 Formyl Violet, all brands  
 Alkaline Violet C, CA  
 Alphanol Blue GN, 5RN,  
     BR extra  
 Alphanol Black R, BG, 3BN  
 Anthracite Black B, R  
 Anthracene Yellow  
     BN, C, BG  
 Anthracene Acid Brown  
     G, B, R, N  
 Anthracene Chromate  
     Brown EB, ER, WG, 3G  
 Anthracene Chrome Red G  
 Anthracene Chromate Blue  
     XR  
 Anthracene Chromate  
     Violet XB  
 Anthracene Chromate  
     Green B  
 Anthracene Chromate Grey  
     G, KB

For compound shades in a weakly acid bath, combinations of the following Diamine and Wool Colours are used to best advantage:

*For Grey and Mode Shades:*

Diamine Fast Yellow B, FF, FR, A, ACG  
 Diamine Orange G, D  
 Diamine Fast Orange EG, ER  
 Union Fast Orange G, R  
 Union Fast Brown R  
 Diamine Fast Brown G, R, GB  
 Diamineral Blue R, B, BF, 3B  
 Diamine Sky Blue, all brands  
 Diamine Pure Blue A  
 Diamine Fast Blue FFB, FFG  
 Diamine Rose GD  
 Diamine Fast Scarlet GFF, 4BFF  
 Diamine Brilliant Rubine S  
 Diamine Brilliant Bordeaux R  
 Diamine Bordeaux B  
 Diamine Heliotrope B

*For Shading the Wool:*

Indian Yellow G, FF  
 Orange extra  
 Naphtol Blue Black  
 Lanacyl Blue BB, R, BN, RN  
 Lanacyl Violet B, BF

*For Pink, Red and Claret:*

Diamine Rose GD, BD  
 Direct Rose T  
 Diamine Red 4B, 10B  
 Diamine Fast Scarlet, all brands  
 Diamine Brilliant Rubine S  
 Diamine Purpurine B, 3B, 6B  
 Diamine Bordeaux B, S  
 Diamine Brilliant Bordeaux R  
 Union Fast Red R  
 Union Fast Bordeaux FR



*For Green and Olive:*

Diamine Black HW  
Diamineral Blue 3B, B  
Diamine Fast Yellow M, FF, FR  
Diamine Fast Orange EG, ER  
Diamine Orange G, D  
Union Fast Orange G, R

*For Shading the Wool:*

Tetra Cyanole A  
Alizarine Brilliant Green G  
Brilliant Milling Green B  
Naphtol Blue Black  
Indian Yellow G, FF, R  
Orange extra, ENZ, R

*For Brown:*

Diamine Brown 3G, M  
Diamine Fast Brown G, R  
Union Fast Brown R  
Diamine Fast Scarlet GFF, 4BFF, 5BFF  
Diamine Bordeaux B  
Union Fast Orange G, R  
Diamineral Blue B. 3B, BF, R  
Diamine Black HW

*For Shading the Wool:*

Indian Yellow G, R, FF  
Orange extra, ENZ, R  
Naphtol Blue Black  
Lanacyl Blue BB, R, BN, RN

*For Blue and Violet:*

Diamine Sky Blue, all brands  
Diamine Pure Blue A  
Oxy Diamine Blue 5G, 3G, G, B, PG, PB  
Diamine Blue 3B, NC  
Diamine New Blue G, R  
Diamine Bengal Blue G, R  
Diamine Brilliant Blue G  
Diamineral Blue CV, CVB  
Diamine Fast Blue FFB, FFG  
Union Fast Blue F, FR  
Diamine Black BH, BHF, BHN  
Diamine Violet N

Diamine Heliotrope B, O, G  
Diamine Fast Violet BBN  
Union Fast Heliotrope B

*For Shading the Wool:*

Formyl Blue B  
Brilliant Milling Blue B  
Formyl Violet, all brands  
Lanacyl Blue BB, R, BN, RN  
Lanacyl Violet B, BF  
Lanacyl Navy Blue B  
Alphanol Blue GN, 5RN, BR extra

*For Black:*

Oxy Diamine Black JE, JEI, JB, JW, JWB extra  
conc., JWF, JWN extra conc., SOOO  
Para Diamine Black B, BB, FFB, BF extra conc.  
Union Black KD, BB, 3B  
shaded with  
Naphtylamine Black 4B, 6B, X3B  
Alphanol Black BG, R, 3BN

Duatol Colours.

The Duatol Colours offer the advantage that, dyed with the addition of Glauber's salt only, their action towards unions is the same as if the latter were dyed in a weakly acid bath.

Thus they come into consideration for unions the wool portion of which has to be treated with particular care; in this connection see the preliminary remarks in the section "Dyeing in a Weakly Acid Bath", page 254.

The following brands of Duatol Colours are in the market:

Duatol Black 3B, BT, KS, 2902J  
Duatol Blue B, BD  
Duatol Brilliant Blue R  
Duatol Bordeaux B  
Duatol Scarlet G, K10B, 2882J  
Duatol Red 2778J  
Duatol Orange 2777J, 2780J  
Duatol Yellow 2776J, 2816J, 2881J  
Duatol Brown R, B, 2817J  
Duatol Blue Green 2818J  
Duatol Green 2779J  
Duatol Grey 2819J.

*Dyeing Directions for Duatol Colours.*

The Duatol Colours are dyed exactly like the Diamine Colours in a short bath, to which, in addition to the dye-stuff, 2—3 lbs Glauber's salt crystals per 10 gallons liquor are subsequently added. In the case of *deep shades*, enter the goods, after shutting off steam, into the liquor which has been boiled up previously; then run for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour without further heating, and boil for  $\frac{1}{2}$  to 1 hour as required. In the case of *light shades* it is best to commence at 40—50° C. (105—120° F.), then to raise gradually to the boil, and to boil until the wool is dyed sufficiently. Hereafter allow the goods to feed for another  $\frac{1}{2}$  hour in the cooling bath, finally rinse thoroughly, and sour off with weak acetic acid.

For *shading the cotton or the wool*, the Diamine Colours enumerated on page 255 for dyeing in a weakly acid bath, or any Wool Colours which may be dyed neutral, may be used.

The following brands also dye silk very well, being thus very well suited for the *dyeing of union goods with silk shots*:

Duatol Scarlet G, K10B,	Duatol Bordeaux B
2882J	Duatol Brown B, R
Duatol Red 2778J	Duatol Brilliant Blue R
Duatol Blue Green 2818J	Duatol Black 3B, BT
Duatol Blue B, BD	

## Methods of Aftertreatment for Enhancing the Properties of Fastness.

Dyeings on unions produced according to the one-bath process in a neutral or a weakly acid bath are as a rule sufficiently fast to washing, milling, light and acids for ordinary requirements. When in some special cases the requirements for fastness are of a more exacting nature, the following methods of aftertreatment may be applied:

### I. Aftertreatment with Metallic Salts — either

- a) Bichrome or Sulphate of Copper alone,
- b) Bichrome and Sulphate of Copper in conjunction,
- c) Chromium Fluoride or Chrome Alum or
- d) Alumina salts.

### II. Aftertreatment with

- a) Formaldehyde or
- b) Formaldehyde and Bichrome.

### III. Coupling with Nitrazol C.

### IV. Diazotising and Developing.

#### I. Aftertreatment with Metallic Salts.

A treatment with chrome salts is applied first of all in order to increase the fastness to washing and milling; an aftertreatment with sulphate of copper on the other hand has the object of improving the fastness to light of the dyeings. A mixture of chrome salts and sulphate of copper enhances the fastness to light as well as the fastness to washing and milling in the case of a good many dyestuffs. Alumina salts serve for increasing the fastness to water and steaming of the dyeings.

For aftertreatment with chrome salts or copper salts, the following dyestuffs are very well suited:

Diamine Fast Yellow A, B, FF, 3G  
 Oxy Diamine Yellow CR  
 Diamine Orange B, D, G  
 Diamine Brown 3G, M, B, R  
 Diamineral Brown G  
 Oxy Diamine Brown G, RN, 3GN  
 Diamine Catechine B, G, 3G  
 Diamineral Blue R, CV, B, BF, 3B, CVB  
 Diamine Dark Blue B  
 Diamine Deep Blue B, R  
 Diamine Fast Grey BN  
 Diamine Fast Black F

aftertreatment with  
 sulphate of copper and bichrome,  
 or with bichrome alone

Diamine Sky Blue FF	}	aftertreatment with copper sulphate
Diamine Brilliant Blue G		
Diamine New Blue R		
Diamine Blue RW, BG		
Oxy Diamine Blue G, 3G, 5G, R		

Diamine Yellow N	}	aftertreatment with bichrome, chromium fluoride or chrome alum
Diamine Green G		
Diamine Fast Red F		
Diamine Bronze G		
Diamine Catechine G, 3G		
Diamine Fast Grey BN		
Diamine Jet Black SS, OO, Cr., RB		
Oxy Diamine Black BM, NF		
Union Black S		
Diamine Fast Black X, F		

*The following Wool Colours come into consideration as resisting an aftertreatment with metallic salts or becoming fixed still better by means of metallic salts, and may be used preferably for dyeings fast to milling:*

Formyl Violet, all brands	Anthracene Yellow C
Alkaline Violet C, CA	Alphanol Black R, BG, 3BN
Brilliant Milling Blue B	Anthracite Black B, R
Formyl Blue B	Milling Red G
Brilliant Milling Green B	Wool Red BG, B.
Tetra Cyanole A	

The dyeings to be aftertreated are simply whizzed or squeezed off, without previous rinsing, and entered into the aftertreating bath at 70—80° C. (160—175° F.) in which they are worked for about ½ hour, after which they are well rinsed.

In the case of deep shades, when the dyebath has not to be preserved for subsequent lots, the aftertreatment may be carried out in the dyebath itself. For this purpose, the requisite metallic salts and acetic acid are added to the dyebath, in which the goods are worked for ½ hour without any further heating. Finally they are rinsed thoroughly.

According to the depth of shade of the dyeings, either

1—2% bichrome	}	of the weight of the material
1—2% copper sulphate		
2—5% acetic acid		
or		
2—3% bichrome, chrome alum or chromium fluoride	}	of the weight of the material
or		
2—3% copper sulphate		
2—5% acetic acid		

are used for the aftertreatment.

Of the *alumina salts*, particularly alum, neutralised alum\* and acetate of alumina are applied on account of their property of enhancing the fastness to water of all dyeings produced with Diamine Colours and of simultaneously increasing their resistance to the wet-steaming process.

The dyed goods are treated in a lukewarm bath containing 4½—8 oz alum or neutralised alum, or 3—5 lbs acetate of alumina 4° Tw., and are then dried without rinsing.

## II. Aftertreatment with Formaldehyde.

By aftertreating with formaldehyde, or formaldehyde and bichrome, the fastness to washing and milling of the following dyestuffs is increased:

Diamine Brown ATC, MR, MRD, S, SD

Diamine Fast Brown G, R

Oxy Diamine Black JE, JEI, JB, JW, TWB, extra conc., JWF, JWN extra conc.

Oxy Diamine Black A, SA, D, US, UI, FFC

Para Diamine Black B, BB, FFB, FF extra conc., BF extra conc.

Diamine Fast Black X, F, XN extra conc., CB high conc., C high conc.

Diamine Aldehyde Black B conc., BB conc.

The aftertreatment is done by working for ½ hour in a fresh bath of 70—80° C. (160—175° F.), containing 3% formaldehyde and 1% bichrome, adding 2.3% acetic acid at the same time if necessary. The aftertreatment may be carried out in the dyebath itself if not intended to be used over again.

\* Neutralised alum is produced by gradually mixing a solution of alum with soda until the precipitate caused by the soda does not dissolve any more when stirred.

III. Coupling with Nitrazol.

The coupling process serves for increasing the fastness to milling and acids of dyeings produced with the following dyestuffs:

Diamine Nitrazol Brown GF, G, RD, BD, T  
 Diamine Nitrazol Green GF, BB, S  
 Oxy Diamine Brown RN  
 Diamine Brown MR, S  
 Diamine Nitrazol Scarlet A  
 Diamine Nitrazol Bordeaux GB  
 Diamine Nitrazol Black B, BB  
 Oxy Diamine Black JW, JWF, JWN extra conc.,  
 JWB extra conc.

After thoroughly rinsing, the dyed material is treated for 20 to 30 minutes in a short, cold bath charged with

3	%	Nitrazol C	} calculated on the weight of the goods
0.75—1.25	%	soda ash	
0.20—0.30	%	acetate of soda	

and then rinsed once more.

For dissolving, mix Nitrazol C with a little cold water, carefully crushing any lumps which may have formed and bringing completely to solution by pouring a sufficient quantity of cold water over the whole.

The coupling bath is first of all charged with the filtered Nitrazol solution, then with the soda and acetate of soda.

For piece-goods, the coupling process is applied either in the jigger or in the rinsing machine, and for loose material also in the rinsing beck, by shutting off the water supply after rinsing, adding Nitrazol, soda and acetate of soda to the bath, working for 20 to 30 minutes, and rinsing once more.

IV. Diazotising and Developing.

Diazotising and developing are applied in the production of dyeings fast to perspiration, washing, milling and acids, particularly on linings and ladies' dress materials, as well as on union yarn, union shoddy etc., and is used chiefly for the following dyestuffs:

*For Black:*

Diamine Black BH, BHF, BHN, BHR	} diazotised, and developed either with phenylene Diamine alone or with Phenylene Diamine and Beta Naphtol together
Diamine Azo Black B	
Diaminogene B	
Oxy Diaminogene OB, OT	
Diamine Beta Black B	

*For Navy Blue and Blue:*

Diamine Black BH, BHF, BHN, BHR	} diazotised, and developed with Beta Naphtol
Diaminogene Blue NB, NA, 3RN, 2RN	
Diamine Azo Blue R, RR	
Diamineral Blue CVB	

*For Red and Claret:*

Primuline	} diazotised, and developed with Beta Naphtol
Diamine Azo Scarlet A, B, KRO, 4B, 8B, 4BL, extra, 6BL extra, 8B extra	
Diamine Azo Bordeaux B	
saddened with	
Diamine Azo Blue RR	
Oxy Diamine Violet BF	
Diaminogene Blue 3RN, 6RN	

*For shading the wool in the same bath, the following dyestuffs come into consideration:*

*For Black:*

Naphtylamine Black 4B, 6B  
 Neutral Wool Black BG  
 Alphanol Black 3BN, BG  
 Naphtol Blue Black  
 Formyl Violet S4B, 10B  
 Indian Yellow G.

*For Navy Blue and Blue:*

Formyl Violet S4B, 10B  
 Brilliant Milling Blue B  
 Formyl Blue B  
 Brilliant Milling Green B  
 Naphtol Blue Black.



*For Red and Claret:*

Milling Red G  
 Wool Red B, BG  
 Rosazeine B  
 Irisamine G.

*Diazotising and Developing.*

The dyeings produced in a neutral or weakly acid bath are rinsed, and *diazotised* for 15 to 20 minutes in a fresh cold bath (for piece-goods best in the jigger) with

2—3% nitrite of soda and  
 6—9% hydrochloric acid or  
 4—6% sulphuric acid.

Hereupon the goods are quickly rinsed in cold water, and *developed* cold in a fresh bath, for

Black with 0.70% Phenylene Diamine, dissolved with half its weight of soda ash, and for

Dark Blue, Red and Claret with 1% Beta Naphtol, dissolved with double its weight of caustic soda lye 77° Tw.

When *developing Black with Phenylene Diamine*, care should be taken always to add sufficient quantities of soda to the developing bath, and to develop as quickly as possible, because, if left in the Phenylene Diamine bath for any length of time, the wool portion of the goods is apt to assume too brownish a tone. The best plan is to use a jigger or padding machine for developing in which it is possible to get the goods through in from 3 to 5 minutes. They are then left lying immersed for another 10 minutes in the developing bath, and are finally well rinsed.

Diamine Azo Scarlet A, B and KRO are best dyed at only 70—80° C. (160—175° F.), and in such case yield good solid shades on the wool and cotton by diazotising and developing without any further shading. Dyeings produced with the other Diamine Colours have as a rule to be shaded with suitable wool colours, either in the same bath or subsequently, in order that a sufficient depth of shade may be obtained on the wool.

### B. Dyeing according to the Two-Bath Method.

This method is applied both for producing plain shades and for goods showing two-coloured effects.

For plain shades, the method is as a rule applied for goods which not would turn out sufficiently even in shade or bright enough in one-bath dyeing. Two-bath dyeing is also sometimes necessary owing to special demands made for fastness.

According to the conditions prevailing in each individual case, either the wool is first dyed, and then the cotton, or vice versâ, according to the following methods:

1. Dyeing the wool previously with Wool Colours and cotton-dyeing subsequently with Diamine Colours;
2. Dyeing the cotton previously with Diamine Colours and the wool subsequently with Acid Colours;
3. Dyeing the cotton previously with Immedial Colours and the wool subsequently with Wool Colours;
4. Wool-dyeing previously with Wool Colours and cotton-dyeing subsequently with Immedial Colours.

#### I. Dyeing the Wool previously with Wool Colours and Cotton-Dyeing subsequently with Diamine Colours.

*Dyeing the Wool previously.* According to the requirements made for fastness, the wool is dyed in an acid bath either with easily levelling dyestuffs or with Acid Colours fast to milling, or again with Chrome Colours, according to the particulars in the tables on pages 108—121 dealing with the dyeing of woollen piece-goods.

*Subsequent Dyeing of the Cotton.* After dyeing in the acid bath, the goods are well rinsed, the cotton being dyed in a fresh cold to lukewarm liquor with the Diamine Colours mentioned further on. In addition to the dyestuff necessary,  $\frac{1}{2}$ —2 lbs Glauber's salt crystals and  $\frac{3}{8}$ — $\frac{3}{4}$  oz soda or ammonia per 10 gallons liquor are added according to the depth of shade required. The dyeing is done in a short bath, either in the washing machine, jigger or dye-vat.

Diamine Colours for Dyeing in a Cold or Lukewarm Bath and for Subsequently Dyeing the Cotton of Unions Previously Wool-dyed in an Acid Bath.

Diamine Fast Yellow A,	Oxy Diamine Violet
AGG, B, FF	B, G, R
Oxy Diamine Yellow TZ, GG	Diamine Brilliant Violet
Diamine Orange G, D	BB, R
Diamine Rose GD, BD, FFB	Diamine Fast Violet BBN
Cotton Red A	Diamine Heliotrope B, G, O
Diamine Red 10B	Diamine Sky Blue FF, FFS
Diamine Purpurine 6B	Diamine Pure Blue A
Diamine Violet Red	Diamine Blue BB, 3B
Diamine Fast Brown	Diamine Fast Blue FFB
GB, G, R	Diamine Green G
Diamine Nitrazol Brown G	Diamine Black BH, BHF,
Diamine Brown S	BHN, BHR, HW, RMW.

If the wool has been dyed previously with Fast Yellow S, Orange GG, Acid Magenta, Acid Violet 4RS, Acid Green extra conc., extra conc. B, 5G, or Water Blue B, R, RB, the goods have to be cotton-dyed subsequently without addition of soda.

After rinsing thoroughly, the goods are soured off by adding some acetic acid to the last rinsing bath, and dried without rinsing again.

The cotton-dyeing of *Blacks* and deep shades such as *Blue*, *Green*, *Brown* etc. in union goods which have been wool-dyed previously is usually carried out in the washing machine with

*Diamine Black RMW*

in combination with

*Diamine Black BH, BHF.*

**Dyeing the Cotton Previously with Diamine Colours and the Wool Subsequently with Acid Colours.**

*a) Cotton-Dyeing Previously in the Jigger or in the Beck.*

Dyestuffs dyed direct which resist wool-dyeing in an acid bath without any particular change in shade are the following:

Diamine Fast Yellow A, AGG	Diamine Fast Blue FFB, FFG
Diamine Orange G, D	Diamine Sky Blue FF
Diamine Fast Scarlet GFF,	Diamine Green CL
4BFF, 5BFF, 7BFF,	Diamine Grey G
8BF, 10BF	Para Diamine Black B, BB,
Diamine Brilliant Rubine S	FFB, BF extra conc.
Oxy Diamine Brown 3GN,	Oxy Diamine Black UI, US,
RN	SA extra conc.
Diamine Catechine B, G	Diamine Milling Black
Diamineral Blue R	B conc., FG extra,
Diamine Bengal Blue G	FFB extra conc.

Dye in a short bath at 50—60° C. (120—140° F.) with

3—4% dyestuff	} per 10 gallons liquor
2 lbs Glauber's salt crystals	
¾—1½ oz soda ash or ammonia	

for about 1 hour. Hereafter rinse well, and cross-dye with Acid Colours according to requirement. For this purpose the easily levelling dyestuffs enumerated in the table for woollen piece-dyeing on page 108 and following pages come in the first place into consideration. It is advisable, however, not to employ mineral acid, but to dye with the addition of acetic or formic acid, at the same time adding some alum or sulphate of alumina. This last-named addition, although unnecessary when wool-dyeing with the Blacks mentioned, is essential when the cotton has been previously dyed with one of the other Diamine Colours indicated.

For instance,

10% acetic acid or 2—3% formic acid and  
4—5% alum or 3—4% sulphate of alumina

may be used. Enter the goods lukewarm, raise to the boil, and boil gently until the bath is exhausted.

The brightness of the cotton dyeings may be increased, when dyeing the wool in the subsequent bath, by adding a slight quantity of Basic Colour, the fastness to acid boiling being thereby likewise improved. Add very slight quantities of Basic Colour to the bath at 30—40° C.

(85—105° F.) charged with acetic acid or formic acid, then enter the goods, and after the Basic Colour has gone on to the fibre, add the Acid Colours together with the alum or sulphate of alumina, raise to the boil, and complete the dyeing at the simmer. For particulars of the subsequent topping with Basic Colours see page 275.

*b) Dyeing the Cotton Previously in the Milling Machine.*

The cotton may also be dyed without resorting to a special dyeing operation, by charging the soap solution used for milling with the cotton dyestuffs required for the purpose, which have been well dissolved previously, then milling in the ordinary manner with this soap solution containing the dyestuff, and finally washing thoroughly with plain water.

For this purpose, any of the dyestuffs mentioned under (a) may be used, particularly the Blacks indicated. These are preferably dyed in a strong sulphuric acid bath, care being taken that the whole of the acid required for effecting the exhaustion is added to the bath on commencing to dye. Enter the goods into the moderately warm bath, raise gradually to the boil, and boil gently until the bath is completely exhausted. If the liquor is not sufficiently acid, the dyestuff is apt to come off the cotton again in the boiling, so that the cotton then has too light and thin an appearance as compared with the wool.

If cross-dyeing is not resorted to, any of the Diamine Colours may be used for dyeing the cotton, particularly those indicated on page 269 for cold-dyeing and subsequent dyeing of the cotton.

*c) Dyeing the Cotton Previously with Coupling Dyestuffs.*

For dyeing the cotton previously, either in the beck or in the jigger, the following coupling dyestuffs are particularly well suited:

Diamine Nitrazol Brown G, RD, B, BD, T

Oxy Diamine Brown RN

Diamine Brown MR, S

Diamine Nitrazol Green GF, BB

Diamine Nitrazol Black B

Oxy Diamine Black JW, JWF.

Dye at 50—60° C. (120—140° F.) with the addition of Glauber's salt and soda, rinse, couple in a cold bath as per directions on page 265, and cross-dye the wool in an acid bath in the customary manner.

*d) Dyeing the Cotton Previously with Diazotisable Dyestuffs.*

This process may be applied both for plain goods and for two-coloured styles. In the latter case the wool is cross-dyed to any desired shade varying from that of the cotton.

The dyeing is done as stated for (a) either in the beck or the jigger, the goods being then rinsed, diazotised, and developed as stated on page 267.

Of the diazotisable dyestuffs, the following are the best suited for the previous cotton-dyeing:

*For Black:*

Diamine Black BH, BHF,	} diazotised and developed with Phenylene Diamine or with Phenylene Diamine and Beta Naphtol
BHN, BHR	
Diamine Azo Black B	

*For plain black*, the wool is then cross-dyed with

Naphtylamine Black 4B, 6B, X3B or with  
Alphanol Black, all brands,

or again with

Naphtylamine Black ESN, ES3B, ES5B etc.

Naphtylamine Blue Black B, 5B,

which latter products should be dyed in a strongly acid bath.

In the case of *two-coloured styles* the wool may be subsequently dyed with any Acid Colours.

For *Navy Blue* and *Blue* the following come into consideration:

Diamine Black BH, BHF, BHN, BHR	} diazotised and developed with Beta Naphtol
Diaminogene Blue NB, NA, 2RN, 3RN	
Diamine Azo Blue RR, R	
Diamineral Blue CVB	

For the wool dyeing in the case of plain shades,

Alphanol Blue GN, 5RN, BR extra

Lanacyl Blue BB, R, BN, RN

Lanacyl Navy Blue B, BB

or the easily levelling dyestuffs

Azo Wool Blue SE, SER

Azo Navy Blue B, 3B

Azo Fast Blue B, BD, BD conc.

Brilliant Naphtol Blue B, 4B, R

may be used

in combination with  
 Acid Violet or  
 Formyl Violet.

In the case of two-coloured effects, the cotton-dyeing should not be done too hot so that the wool does not absorb too much dyestuff and may be dyed subsequently to any shade desired.

For *Red* and *Claret*, the following dyestuffs come into consideration:

Diamine Azo Scarlet 4B, 8B, 4BL extra,	} diazotised and developed with Beta Naphтол
6BL extra, 8B extra,	
Diamine Azo Bordeaux B	
saddened with	
Diamine Azo Blue RR	
Diaminogene Blue 3RN, 6RN	

For dyeing a solid red shade subsequently on the wool, acid-dyeing Reds come into consideration (see page 114). For two-coloured styles, such Acid Colours as are required in each case are used.

### III. Dyeing the Cotton previously with Immedial Colours and the Wool subsequently with Wool Colours.

This method is particularly to be recommended for piece-goods, for which the requirements for fastness to light, milling, perspiration and acids are particularly exacting. It is applied principally for the production of staple shades of Black, Blue and Brown; the dyeings thus produced are distinguished for their eminent fastness and pleasant handle of the material.

The dyeing is carried out in a jigger provided with squeezing rollers, or else in the continuous dyeing machine in a bath correspondingly strengthened. The Immedial Colours best suited for this purpose are enumerated on the tables of page 314 and succeeding pages.

For preparing the dye-liquor, dissolve the Immedial Colours in water together with their own weight of sodium sulphide and double their weight of glucose, and boil for 10 to 15 minutes. Enter this solution into the cold dye-bath, and then add subsequently  $1\frac{1}{2}$  oz soda,  $1\frac{1}{2}$  oz Turkey-red oil, and, varying with the depth of the shade to be dyed, 8 oz—3 lbs Glauber's salt crystals per 10 gallons liquor, and dye the previously well wetted goods for 1 hour at 30—35° C. (85—95° F.). Hereafter squeeze off well, and wash thoroughly.



Instead of glucose, either borax or Immedial Developer C may be used. In such case the Immedial Colour is dissolved together with the requisite quantity of sodium sulphide. This solution is poured into the dyebath, and after adding borax or Immedial Developer C together with soda, Turkey-red oil and Glauber's salt, the goods are dyed in the same way as when using glucose, as aforesaid.

When dyeing on the old bath, only one-quarter to one-third of the quantity of glucose, borax or Immedial Developer C used for the starting bath are necessary in addition to the reduced quantities of dyestuff and sodium sulphide.

For cross-dyeing the wool, either Acid or Chrome Colours may be used, according to the demands for fastness, as per the directions on the dyeing of woollen pieces on pages 108—121.

*When using Immedial Black or Immedial Carbon for dyeing the cotton black, the goods must be treated after the acid cross-dyeing with  $4\frac{1}{2}$ —8 oz acetate or formate of soda per 10 gallons liquor.* It is best to add the acetate or formate of soda to the last rinsing water, and then to dry without washing again. For Indo Carbon this treatment is unnecessary.

#### IV. Dyeing the Wool previously with Wool Colours and the Cotton subsequently with Immedial Colours.

This method is applied chiefly with a view to obtaining deep shades of good fastness to milling and light on yarn and shoddy. The wool is in this case dyed according to the process customary for loose wool with Acid Colours fast to milling, or better still, with Chrome Colours, in accordance with the particulars on wool dyeing, on page 24 and following pages, and well rinsed, whereupon the goods, with a view to dyeing the cotton, are entered into the Immedial Colour bath at 30—35° C. (85—95° F.) prepared as indicated sub III (page 273). Work the goods well, and leave them for 1 to 2 hours in the bath without further heating, or, if the material is difficult to penetrate, overnight. Yarns are treated for 1 to 2 hours whilst being continually turned. When the dyeing is complete, the yarn is wrung off or squeezed off well; shoddy on the other hand should be thrown into baskets, so that the liquor running off may flow back into the dyebath. Hereupon the goods are rinsed



well, and soured off with acetic acid. Material which has been dyed with Immedial Black or Immedial Carbon should be aftertreated with acetate of soda as stated above.

### Dyeing and Topping with Basic Colours.

In the case of very bright shades, the half-wool dyed according to the one-bath or two-bath processes may be subsequently topped with Basic Colours. Or, the wool is first acid-dyed, the goods being then mordanted according to the depth of shade required with the addition of 2—5% tannin for 2 to 3 hours in a cold to lukewarm bath, hereafter whizzed or squeezed off well, then fixed in a fresh, cold bath with 1—2½% of some antimony salt for 20 to 30 minutes, and well rinsed, being cotton-dyed cold with Basic Colours with the addition of 2—4% acetic acid.

All the Basic Colours, particularly the following which go on to the wool but very slightly, are suited for this purpose:

Thioflavine T, TCN	Crystal Violet 10B, 5B bluish
Para Phosphine G, GG, R	Indazine M
Diamond Phosphine GG, R,	New Blue R, G, B
D, PG	Methyl Indone B
Tannin Orange R	Neutral Blue
Bismarck Brown GG, EE	New Methylene Blue N, GG
Safranine, all brands	Methylene Blue BB
New Magenta	Brilliant Green Crystals
Diamond Magenta	extra
Tannin Heliotrope	Malachite Green conc.
Fast Neutral Violet B	Solid Green.

After dyeing, the goods are thoroughly rinsed in order to prevent any bronzing caused by the Basic Colours on the wool, then weakly soaped, and once more rinsed well.

### Stripping Shoddy, Dark Shoddy Cloths and Defectively Dyed Shades.

Stripping is resorted to if dyeings for some reason or other are useless, or if light shades are to be dyed on dark shoddy material.

The methods mostly applied for stripping are indicated on pages 43—45.

### Bleaching of Unions.

Union Goods are bleached in the same way as stated for wool (page 50). a clean, clear white being obtained which comes into consideration either for White or for bright shades, usually light ones which do not turn out clear enough on unbleached material.

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## Methods for Dyeing the Most Important Union Goods.

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### Gentlemen's Suitings (Worsted Goods, Cheviot etc.).

*These materials are dyed almost exclusively according to the one-bath method with the combinations of dyestuffs stated in the tables on pages 314—329.*

In certain cases, especially when the requirements for fastness of the colours are very high, the two-bath method (dyeing the cotton first with Immedial Colours and the wool subsequently with Acid Colours) is likewise applied, and imparts at the same time a good handle to the goods. (For directions see page 273).

Union worsted cloths, particularly such with white and coloured shots, are also produced by interweaving white threads and such dyed fast to acids with undyed wool and cotton dyed with Immedial Colours, and then cross-dyeing the wool in an acid bath. For the wool colours and methods of dyeing applied for this purpose, see the tables on pages 108—121. For Blues and Blacks, which are the colours dyed most, the cross-dyeing of the wool is done with the following dyestuffs:

#### *For Blue:*

Lanacyl Blue BB, R, BN, RN	} Methods I, II, III and VII, pages 4, 5, 6 and 10
Lanacyl Violet B, BF	
*Lanacyl Navy Blue B, BB	
Alphanol Blue GN, 5RN, BR extra	
*Azo Fast Blue B, BD, BR conc.	
Fast Navy Blue B, G	
Peri Wool Blue B, G, BG	

which may be used for solid goods as well as for goods with effect threads.

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\* The dyestuffs mentioned are sufficiently fast for normal demands regarding fastness to steaming and perspiration; the dyestuffs marked with an asterisk (\*) resist also severe steaming.

In the case of high demands for fastness to perspiration,

*Azo Chrome Blue T, TB	} Methods X and XI, pages 12 and 13
*Anthracene Chrome Blue F, G, BB, B, R, FR	
*Anthracene Acid Blue EB, ER, BB, 3B, BBN, RT	

come into consideration, and may, with the exception of Anthracene Chrome Blue BB and G, be used also for goods with shot effects.

*For Blacks:*

For solid goods, any of the Naphtylamine Blacks (pages 5 and 7) may be applied; for goods with shot effects,

*Naphtylamine Black S, ES8B, ES5B, ES3B, EFF, ESN, SGG	} Method II, page 5
*Naphtylamine Blue Black B, 5B	

may be used.

For dyeings of particularly good fastness to perspiration, the following dyestuffs come into consideration:

Alphanol Black BG, R, 3BN, K4BN, KV	} Method V, page 8
*Anthracene Chrome Black, all brands	
Anthracene Acid Black SR*, SBB, DSF, DSN, DSFB, DNG	} Methods X and XI, pages 12 and 13
*Naphtyl Blue Black N	

*Naphtylamine Black R	} dyed with the addition of sulphate of copper, Method VI, page 9

and for goods with shot effects:

Naphtylamine Black Cr	} Methods X and XI, pp. 12 and 13
Anthracene Acid Black ST, SR, SRT	

In the subsequent dyeing of the wool with Acid Colours it is an advantage to use acetic or formic acid in the place of sulphuric acid, in order to prevent an impairing of the cotton fibre through mineral acid. As a rule, 5—10% acetic acid 8° Tw. or 1.5—3% formic acid 85% will be sufficient.

After dyeing, the goods should be well rinsed, being finally treated in a bath containing 8 oz acetate or formate of soda per 10 gallons water, and then dried without rinsing again.

\* The dyestuffs mentioned answer normal demands for fastness to steaming and perspiration; those marked with an asterisk (\*) resist also more severe steaming.

**Ladies' Costume Cloths, Worsted Cloth, Meltons, Presidents.**

These classes of goods are usually dyed according to the *one-bath method*. For superior, faced goods of this kind it is advisable to dye in a weak acid bath (with the addition of salammoniac or acetic acid). In certain cases the *two-bath method* also comes into consideration. Apart from Black and Dark Blue, there is a demand for all kinds of fashionable shades, ranging from light to deep, particularly on ladies' costume cloths and meltons, which shades are dyed with *the combinations of dyestuffs indicated in the tables on page 314 and following pages*.

For light mode and drab shades, the following dyestuffs are particularly well suited:

Union Fast Grey BR, G  
 Union Fast Blue F  
 Diaminogene B, extra  
 Diamine Dark Blue B  
 Diamine Fast Blue FFB  
 Diamine Fast Grey BN  
 Lanacyl Blue BB, R, BN, RN  
 Alizarine Cyanole B  
 Alizarine Cyanole Violet R  
 Alizarine Brilliant Green G  
 Diamine Orange B  
 Union Fast Orange G, R  
 Union Fast Brown R  
 Diamine Fast Orange EG, ER  
 Diamine Catechine B  
 Diamine Fast Yellow B, M, FF, FR.

*Blacks on ladies' costume cloths and worsted cloth* are also produced by spinning undyed wool together with cotton dyed with Immedial Black, and cross-dyeing the former in the piece. In this case particular care should be taken that the cotton is dyed a sufficiently deep shade and that it is well carded, as it is otherwise apt to form burls in the goods when made up.

The goods produced in this manner must after the acid cross-dyeing be treated with acetate or formate of soda in accordance with the directions on page 348.

Presidents produced from mungo or shoddy of a deep shade are usually dyed black, but they are frequently also dyed other deep shades such as dark brown, brown, olive, green etc.; the greatest variety of shades is produced by

printing-on white and coloured discharges. For the dyestuffs to be applied for discharge prints and for the production of the discharges see page 343 as well as pages 209—216 of our "Manual of Dyeing", Vol. IV.

In addition to the white cotton warp, these goods also contain a good deal of cotton in the weft, which of course has to be dyed a sufficient depth of shade.

For this purpose, greenish Blacks are given the preference, these being dyed with

Oxy Diamine Black JE, JEI. JB

Union Black OJGJ, 1975J, KFO

in combination with

Diamine Black HW

Diamine Green B, CL

Diamine Dark Green N

Formyl Blue B

Brilliant Milling Green B

Naphtol Blue Black.

These products show little tendency to bronze, a circumstance which is of course of importance when necessarily dyeing the cotton a deep shade, and on this account they are particularly well suited for the dyeing of presidents.

### Flannel and Imitation Lambskin.

These goods are usually dyed according to the one-bath method which allows of the quick working necessary in order to preserve the material in good condition and make it retain the requisite soft, woolly handle.

*For mode shades, combinations of dyestuffs as indicated in the tables of page 314 and following pages come into consideration*, while the bright shades of yellow, red, blue, violet etc. which are frequently in demand for these goods are best obtained as follows:

*Scarlet* by dyeing with

2—3% Diamine Scarlet B

in combination with

Rosazeïne B

Diamine Yellow CP,

or for bluer shades with Diamine Scarlet 3B dyed near boiling temperature. If Diamine Red 4B, Diamine Purpurine B or Diamine Fast Scarlet GFF or 4BFF are used along with Diamine Scarlet, the goods may also be boiled for some length of time.

Dyeings of better fastness to storing and stoving are obtained first by dyeing the wool with Brilliant Scarlet according to the two-bath method at the boil, and cotton-dyeing subsequently with Diamine Red 4B or Diamine Purpurine 6B.

*Bright Yellow* with

Diamine Fast Yellow 3G, dyed with the addition of 8 oz phosphate of soda per 10 gallons liquor boiling hot; or with:

3—4 % Thioflavine S

in combination with

1—1.5% Naphtol Yellow S or Fast Acid Yellow 3G dyed at about 50° C. (120° F.) with the addition of 2% acetic acid and 2—4 lbs of Glauber's salt crystals per 10 gallons liquor.

*Pink* with

Diamine Rose GD, BD, FFB

Direct Rose T

Diamine Brilliant Rubine S

shaded with

Rosazeïne B, 6B

Irisamine G

Erythrosine B, D.

Dyed with the addition of 10—20% Glauber's salt crystals and 1—2% acetic acid at 40—50° C. (105—120° F.)

*Light Blue* and *Medium Blue* are produced with combinations of

Diamine Sky Blue, FF, FFS, FFN

Diamine Pure Blue A

Diamine Blue BB, 3B

Oxy Diamine Blue PG, PB, PR

Diamine Brilliant Blue G

Formyl Blue B

Brilliant Milling Blue B

Brilliant Milling Green B

Tetra Cyanole A

Alkaline Blue 6B—3R

with the addition of Glauber's salt, or, with the exception of Alkaline Blue, with Glauber's salt and slight quantities of acetic acid, and, if necessary, topped in a fresh, cold bath, acidified with acetic acid, with

Methylene Blue BB  
New Methylene Blue N  
Victoria Blue B.

When using Alkaline Blue the goods must after rinsing be soured off in a bath weakly acidified with sulphuric or acetic acid, and once more thoroughly rinsed.

Bright Violets and Heliotropes are produced by first dyeing with

Diamine Violet N  
Diamine Heliotrope B, O, G  
Diamine Brilliant Violet B, RR  
Diamine Fast Violet BBN  
Diamine Brilliant Rubine S  
Formyl Violet S4B  
Brilliant Croceïne etc.

in a Glauber's salt bath, and topping with

Methyl Violet  
Crystal Violet 10B, 5B bluish  
Diamond Magenta.

It is best to use an addition of 3—4% acetic acid for the topping, entering the goods cold, and heating to 40—60° C. (105—140° F.) with a view to dyeing the wool a sufficient depth. Light shades which are to be particularly clear and bright are frequently dyed on these goods as so-called "Stoved Colours", according to the directions on next page, the following dyestuffs coming into consideration for the purpose:

*Cream:*

Diamine Gold  
Diamine Yellow CP  
Diamine Fast Yellow, all brands  
Diamine Orange F, G, D  
Diamine Fast Orange EG, ER  
Oxy Diamine Orange G, R  
shaded with

Indian Yellow G, FF  
Para Phosphine G, GG  
Diamond Phosphine GG  
Rosazeïne B, 13  
Irisamine G.



*Light Yellow:*

Thioflavine S  
 Oxy Diamine Yellow GG, TZ  
     shaded with  
 Thioflavine T, TCN.

*Pink:*

Diamine Rose GD, BD, FFB  
 Direct Rose T  
 Diamine Brilliant Rubine S  
     shaded with  
 • Rosazeine B, 13  
 Irisamine G  
 Erythrosine B  
 Rose Bengale extra N.

*Light Blue and Light Green:*

Diamine Sky Blue, FF, FFS  
 Diamine Pure Blue A  
 Thioflavine S  
 Oxy Diamine Yellow TZ  
 Diamine Yellow CP  
     shaded with  
 Formyl Blue B  
 Brilliant Milling Blue B  
 Brilliant Milling Green B  
 Victoria Blue B  
 New Methylene Blue N  
 Thioflavine T, TCN.

*Violet:*

Diamine Violet N  
 Diamine Brilliant Violet B, RR  
 Diamine Heliotrope B, O. G  
 Diamine Fast Violet BBN  
     shaded with  
 Methyl Violet 3B—6B  
 Crystal Violet 10B.

Prepare a bath of 40—50° C. (105—120° F.), to which  
 add, when dyeing with Diamine and Acid Colours,  
     5% Glauber's salt crystals, and if necessary also  
     3—8 oz soap per 10 gallons liquor,  
 or, when using Diamine and Basic Colours,  
     3—8 oz soap per 10 gallons liquor

and nothing besides; dye for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour, whizz thoroughly, leave for 5 to 6 hours or overnight in the stoving chamber, rinse lightly in cold water, whizz again, and dry exposed to the air.

Goods dyed with the addition of Glauber's salt only are to best advantage passed through a cold soap bath and whizzed once more before being taken into the stoving chamber.

### Union Linings, Italians, Serge etc.

The goods, having been singed on the gas- or plate-singeing machine, are crabbed boiling hot under pressure, if necessary with the addition of a little soda, then wound on to the steaming cylinder, and steamed for 10 minutes, cooled down, and then re-wound round the steaming cylinder and steamed once again. They are now ready for dyeing, and may be dyed a great variety of shades, Black coming however principally into consideration.

In dyeing a distinction is drawn between

- a) *Goods containing a White Warp and*
- b) *Goods containing Warps dyed Fast to*  
*Cross-Dyeing.*

#### a) Goods containing a White Warp.

The dyeing of such goods is done either by the one-bath method or in several baths; the wool is first dyed with Acid Colours, the cotton being dyed with Diamine or Basic Colours on a tannin and antimony mordant or again on a sumac and iron mordant.

*Black* may be dyed both by the one-bath and the two-bath methods (by cotton-dyeing first and wool-dyeing subsequently).

For the *one-bath method*, the various

Oxy Diamine Black brands A, D, JB, JW, FFC,  
BM etc.

Para Diamine Black B, BB, FFB, FF extra conc.,  
BF extra conc.

Union Black S, P, BG, BB, 3B etc.

are used, in combination, according to requirement, with

Naphtylamine Black 4B, 6B, X2B, X3B

Alphanol Black BG, R, 3BN

Naphtol Blue Black

Naphtol Dark Green G

Brilliant Milling Green B

Formyl Blue B

Formyl Violet S4B.

As customary with other union goods, a short bath is used, and it is an advantage, particularly for Blue-Black, to boil for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour first with Naphtol Blue Black or Naphtol Dark Green G and Formyl Violet with the addition of Glauber's salt, and, after shutting off the steam, to add

Union Black S or Oxy Diamine Black BM,

or, for cheaper articles,

Oxy Diamine Black A, D,

Para Diamine Black B, BB, FFB, FF extra conc.

BF extra conc.

To take a case:

Boil with about

0.6% Naphtol Blue Black

0.5% Formyl Violet S4B

and 2 lbs Glauber's salt crystals per 10 gallons liquor for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour, shut off steam, add

4.5 % Oxy Diamine Black BM

0.25% Diamine Fast Yellow A

and work for  $\frac{3}{4}$  hour. If the wool is then still too light, while the cotton is sufficiently dyed, raise the temperature once more to the boil, and boil until the desired depth of shade is attained on the wool.

For *Jet Black* a similar procedure is adopted, but the quantities of Naphtol Blue Black and Formyl Violet are reduced, while those of Oxy Diamine Black or Para Diamine Black are increased. It is still simpler to work in the usual manner while simultaneously adding all the weights of dyestuff required.

After dyeing, the goods are straightaway taken through a second bath with a view to rendering them fast to the subsequent operations such as steaming and crabbing, and treated in a second bath with 3% bichrome and  $\frac{1}{4}$ — $\frac{1}{2}$ % sulphuric acid for  $\frac{1}{2}$  hour at about 50° C. (120° F.) Hereupon the goods are rinsed well.

If the goods are crabbed only lukewarm or not at all, but are merely wet-steamed, it is sufficient to treat them with 3—5% neutralised alum\* in a lukewarm liquor in the vat or with 3—4½ oz neutralised alum per 10 gallons liquor, and to give two passages in the padding machine.

In steaming and crabbing, care has to be taken that the goods are wound on to sufficiently wide and long end-cloths, and wrapped round with similar cloth of sufficient dimensions, and that these forerunners are dyed and aftertreated in the same manner as the goods, as otherwise the ends will turn out light in shade. The steaming should moreover be only maintained until all the liquid is removed from the roll; if the goods are treated in a correct manner, the liquid draining off should be almost entirely colourless.

After cooling, the steamed goods are singed on the plate-singeing machine, then rinsed once more in the padding machine, filled according to their quality with

1—2 lbs dextrine	} per 10 gallons water
8 oz gum tragacanth	
1—2 lbs glucose	
3—5 lbs Epsom salts	

dried on the tentering frame, cropped, and pressed.

This Black produced by the one-bath method and sized as indicated has the advantage over the Black dyed in several baths of a simpler production, which is a matter of importance in bulk dyeing.

If a weighted Black with a good handle is desired, the goods dyed by the one-bath process and rinsed are treated for about 1 hour in the jigger with 3—5 lbs extract of sumac per 10 gallons, then, after having been left lying for several hours, are passed through a bath charged with pyrolignite of iron or a mixture of pyrolignite or nitrate of iron, hereafter rinsed well, and finished off.

According to this method of working, the goods, without much additional labour, obtain a considerably better and harder handle than by the one-bath method, the cotton being at the same time dyed a very deep shade. According to requirement, a light sizing with dextrine or glue may then be applied.

\*Neutralised alum is produced by diluting a solution of alum gradually with soda until the precipitate caused by the soda no longer goes into solution on stirring.

A cheap *Black* of good handle is obtained *according to the two-bath method* by cotton-dyeing first in a bath of about 60° C. (140° F.) with a Black fast to acids (Oxy Diamine Black US, UI, SA, Para Diamine Black B, BB, FFB etc. see page 270) and wool-dyeing subsequently in a fresh bath, either according to the process with Naphtyl Blue Black N and sumac (as indicated for cashmere on page 292) or with one-bath Logwood Black, in combination, if necessary, with Naphtylamine Black.

For this purpose charge the boiling hot bath with 4—6% logwood extract, 5% copperas, 3% copper sulphate and a sufficient quantity of oxalic acid (2—3%) to give the black liquor a yellowish to brownish tinge. Hereafter add the requisite quantity of Naphtyl Blue Black N or Naphtylamine Black R, and if necessary some Formyl Violet S4B, enter the goods, boil for  $\frac{1}{2}$  to 1 hour, and finally add some ammonia or soda ( $\frac{1}{2}$ —1%), and treat, without further heating, for another hour.

If the demands for fastness to perspiration are high, and a good handle is desired at the same time, *black linings are first dyed in the beck, jigger or continuous dyeing machine with a diazotisable Black, such as Diamine Black BH, BHF, BHN, and BHR*, then diazotised, and developed with Phenylene Diamine or with Phenylene Diamine and Beta Naphtol (see page 267).

Dye in the vat for instance with

5—6% Diamine Black BH in the starting bath,  
reckoned on the weight of the goods,

2 lbs Glauber's salt crystals }  
 $\frac{3}{4}$  oz soda } per 10 gallons liquor,

for 1 to 1 $\frac{1}{2}$  hours at 50—60° C. (120—140° F.), diazotise and develop, rinse, and then wool-dye in the customary manner in a boiling acid bath.

For this purpose, the various Naphtylamine Black or Naphtylamine Blue Black brands, or else Alphanol Black K4BN, KV, which are very fast to perspiration, come into consideration, provided a Chrome Black such as Anthracene Acid Black or Anthracene Chrome Black is not preferred for particularly good fastness to perspiration.

Still better fastness than with developed Diamine Black can be obtained with Immedial Black according to the process given on page 273. The wool in such case also is dyed subsequently as above indicated.

Fancy shades, medium and deep, are in most cases likewise dyed by the two-bath method. The wool is dyed as customary with easily levelling dyestuffs, the cotton being dyed subsequently with Diamine Colours in the manner indicated on page 268, or with Basic Colours on a mordant of tannin and antimony or sumac and iron as indicated on page 275.

Very light and clear shades are however best dyed by the one-bath method.

#### b) Goods containing Warps Dyed Fast to Cross-Dyeing.

Goods with a warp dyed fast to acids are used chiefly for Black, and also for Dark Blue and Dark Brown; in any case, black warps should be dyed either with a diazotisable Black or with Immedial Black. All that has to be done in this case is to dye the woollen weft in the piece, which is considerably simpler than dyeing the goods with a white ground. Previously dyed warps are also used more particularly for goods which are to contain white or coloured effect threads.

For *Black with effect threads*, Naphtylamine Black EFF and Naphtylamine Blue Black B and 5B are used principally, and for goods of better fastness to perspiration Anthracene Acid Black ST and SRT also come into consideration (see page 278).

For *plain Blacks*, any one of the Naphtylamine Blacks may be used, and for dyeings of good fastness to perspiration, Alphanol Black KV, K4BN, as well as the afore-mentioned Anthracene Acid Black brands likewise come into consideration.

Goods containing cotton dyed with Immedial Black or Immedial Carbon should, after the acid cross-dyeing and rinsing, be treated with acetate or formate of soda, and then dried without any further rinsing; see page 348.

#### Alpaca and Lustrous Goods.

The chief consideration, with a view to producing satisfactory results in the case of goods consisting of a cotton warp and a weft of lustrous worsted or mohair yarn, is a suitable preparatory treatment. Among the points to be observed are an even, perfectly straight beaming of the pieces, free from any creases, on to the rollers on which they are boiled, crabbed and steamed, as well as a careful singeing and steaming.

The steaming cylinder should not be perforated along its whole length but a little less than the width of the goods; it should be covered with a few layers of coarse linen cloth, and a back cloth should be wrapped round the end of the rolled up piece.

For the preparing, alpaca and lustre goods are rolled firmly and evenly on to a roller in lengths of about 200—250 yards and crabbed without roller pressure in the crabbing machine in boiling water with the addition of ammonia and soap. They are then passed through the next box filled with cold water, passing below the upper roller, without pressure, and are rolled on to the cylinder for the steaming. After the steam has penetrated the goods evenly, it is allowed to pass through for another 5 minutes, whereupon the goods are either left to cool on the cylinder or for cooling passed through cold water. When dry, they are singed on the plate-singeing machine.

The dyeing is similar to that of linings which contain either a white warp or a coloured warp dyed fast to cross-dyeing.

The principal style is *Black*, which is almost invariably produced with a warp previously dyed with Immedial Colours.

The suitably prepared goods are cross-dyed in the customary manner with Naphtylamine Black, or, in the case of styles for which a fastness to perspiration is demanded, with either Alphanol Black or with Anthracene Acid Black or Anthracene Chrome Black. In the case of goods with white or coloured effects, Naphtylamine Black EFF, S, etc., Naphtylamine Blue Black B, 5B or Anthracene Acid Black ST, SRT are used, same as indicated for italians and serge.

*Goods containing a warp dyed with Immedial Black are treated with acetate or formate of soda after the acid cross-dyeing and rinsing, as described on page 348.*

Goods with a grey warp are dyed black to best advantage according to the two-bath method by cotton-dyeing in the piece with Diamine Black BH, BHF, BHN, BHR, diazotising and developing, and cross-dyeing the wool in an acid bath.

With the exception of dark blues and browns, which frequently contain a black warp, fancy shades are dyed in an acid bath, the cotton being dyed subsequently in a weak



alkaline Glauber's salt bath with Diamine Colours or with Basic Colours on a tannin and antimony or sumac and iron mordant.

The cotton dyeing with Diamine Colours is described on pages 268 to 269.

For cotton-dyeing with Basic Colours, the goods, which have been wool-dyed in an acid bath, are treated in a cold to lukewarm bath for 2 to 3 hours or overnight, in the case of pure clear shades with 2 to 5% tannin, or for covered dull shades with 5—15% sumac extract of 51° Tw., or with a decoction of sumac leaves. They are then squeezed off well or whizzed, and turned for 20 to 30 minutes in a cold bath with 1 to 2½% antimony salt or in a ¾ to 3° Tw. liquor of nitrate of iron. After rinsing well, the goods are dyed to shade with Basic Colours in a cold bath with the addition of acetic acid, and rinsed once more thoroughly.

For dyestuffs suitable for dyeing the mordanted cotton see page 275.

Very light shades are either dyed hot by the one-bath method in a neutral Glauber's salt bath, or, as is frequently done, by simply padding in a lukewarm bath with Diamine or Basic Colours.

### Union Cashmere.

With this fabric, which consists of a cotton warp and a soft botany weft, good results are dependent upon a correct preparing. .

The goods are first of all singed on the plate- or gas-singeing machine, then crabbed. For this purpose the goods rolled evenly list upon list are treated for 15 to 20 minutes without pressure in boiling water to which a little soap and ammonia or soluble glass may if necessary be added, whereupon they are run in another hot bath on to the lower of a pair of rollers into a second trough, where they are treated in the same manner as in the first. They are then passed through cold water, washed in the washing machine, rolled up evenly, and steamed for 2 to 3 minutes in order to remove any creases caused by the washing.

The goods treated in this manner, which as a rule contain a grey warp, or for better-class styles a cotton warp dyed fast to acids, are then dyed. They may be dyed either black or to any shade desired.



Goods with *warps fast to acids* may be cross-dyed according to requirement with a great variety of Acid Colours, for black with

Azo Merino Black, all brands  
 Naphtylamine Black, all brands  
 Alphanol Black, all brands  
 Anthracene Acid Black, all brands;

for dark blue with

Azo Fast Blue B, BD, BR conc.  
 Azo Wool Blue 6B, SE, SER  
 Brilliant Naphtol Blue B, 4B, R;

for dark brown, dark green etc. with combinations of

Cyanole Green B, 6G  
 Cyanole Fast Green G  
 Acid Yellow AT  
 Fast Acid Yellow TL, 3G  
 Lanafuchsine SG, SB  
 Brilliant Lanafuchsine BB, GG, SL.

In case of higher requirements for fastness, the various Chrome Colours will likewise come into consideration (see the chapter on the Dyeing of Piece-Goods, pages 108—121).

*All-grey* goods are dyed either by the one-bath or the two-bath method. The one-bath method is usually resorted to for dark tones, blacks in particular, fancy colours on the other hand being as a rule produced by first dyeing the wool in an acid liquor and cotton-dyeing subsequently. For dyeing directions see page 268.

*Blacks* for cheap styles are frequently obtained by cotton-dyeing first with a direct-dyeing black fast to acids, such as

Para Diamine Black B, BB, FFB extra conc.  
 BF extra conc.

Oxy Diamine Black US, UI etc.

(method on page 270) and cross-dyeing the wool with Acid Colours in the manner desired.

In place of a direct-dyeing Black, Diamine Black BH, BHF, BHN etc. diazotised and developed may be used for dyeing the cotton first (see pages 267 and 272).

In the case of blacks a harder handle is frequently desired than is obtainable by the aforementioned method,

and a certain increase in the weight through the dyeing process is likewise expected. These results can be obtained by cotton-dyeing with a direct black fast to acids, or by dyeing according to the diazotising process and covering the wool subsequently in the following manner:

Charge the bath with

- 2.5—3 % oxalic acid
- 2—2.5 % Naphtyl Blue Black N
- 1 % Naphtol Blue Black
- 7—10 % sumac extract
- 10 % Glauber's salt crystals and, according to requirement, a little Formyl Violet or Formyl Blue B.

Enter the goods into the hot bath, raise to the boil, and boil for about one hour; then add

- 1—2 % copper sulphate
- 3—5 % copperas,

and treat without any further boiling for another  $\frac{1}{2}$  hour. Hereafter rinse thoroughly.

In subsequent dyeing, the precipitate which has formed is first dissolved by an addition of oxalic acid; the Glauber's salt and dyestuff are then added, together with 4—5 % sumac extract. The procedure is the same as for the first lot.

For cheap articles the goods first cotton-dyed may be subsequently dyed with one-dip logwood black as indicated in the section on italians, serge etc., in combination with Naphtyl Blue Black or Naphtylamine Black. After dyeing, the goods must be very thoroughly rinsed.

Fancy colours are dyed with Acid Colours in the customary manner, the cotton being finally dyed with Diamine Colours in a weakly alkaline bath. For goods requiring a full handle, Basic Colours are used on a tannin and antimony or sumac mordant as described on page 275.

When dry, the goods are singed again if necessary, rinsed once more, squeezed off well (low-class goods are given a finish with gelatine or dextrine with the addition of a little glycerine), dried, and pressed.

#### Fabrics Composed of Wool and Mercerised Cotton

are best dyed in one bath with Diamine Colours of good fastness to light. Owing to the mercerised cotton

displaying far more affinity to Diamine Colours than ordinary cotton, and in view moreover of the cotton portion of these goods being generally required lighter in tone than the wool (contrary to other union goods), the method of working differs somewhat from that for other union goods. The Diamine Colours of Group 3 which go easily on to the wool are principally used, or the dyestuffs of the first or second group together with suitable wool colours, the dyeing being carried out under continuous boiling, or, the dyestuff may be got to go more quickly on to the wool by dyeing in a weak acid bath, and adding some salammoniac or small amounts of acetic acid (see page 254). After the dyeing is complete, the goods are rinsed and soured off feebly with acetic acid.

In addition to the various *colours* for which the customary combinations of dyestuffs (page 314 and succeeding pages) are recommended, *Blacks* in particular are also dyed, for which

Union Fast Black J

Oxy Diamine Black JE, JEI, JB, JW

Diamine Fast Black X, XN extra conc., C high  
shaded with conc., CB high conc.

Diamine Fast Blue FFG, FFB

Diamine Black HW

Alphanol Black BG, 3BN

are particularly well suited.

### Union Crepons.

The production of crepon effects on union goods is based on the property of cotton to shrink when subjected to a treatment with strong caustic soda lye. The union goods, which are loosely woven with a view to obtaining the desired crimped styles, are treated for a short while with cooled caustic soda lye of about 32—42° Tw., whereby the cotton shrinks and the desired crimped effect is produced.

The treatment with soda lye, i. e. the mercerising, is in the majority of cases carried out previously to the dyeing; it can however also be done after the dyeing, this way of working being resorted to for blacks and staple shades in particular, but it is essential in such case to carry out the mercerising, souring, rinsing, and neutralising with ammonia (if necessary) in quick succession.

For mercerising, a box with guiding and squeezing rollers is used containing soda lye of 32—42° Tw., which is cooled by means of a suitable cooling arrangement, or with ice, to about 5° C. (40° F.). After passing through the lye for 2 or 3 minutes, the goods are squeezed well and entered into another box containing a cold bath strongly acidulated with hydrochloric or sulphuric acid. Hereafter they are rinsed thoroughly in running water, and neutralised if necessary with ammonia.

Care should be taken that the acid bath always contains a sufficient amount of acid, and that it is still distinctly acid after the passage of the goods.

Dyestuffs not affected by Mercerising in Producing Crepon Effects on Unions.

Diamine Colours.

Thioflavine S	Diamineral Blue R, CV,
Diamine Gold	CVB, B, 3B, BF
Diamine Yellow CP	Diamine Sky Blue
Diamine Fast Yellow A,	FF, FFS, FFN
M, B, FF, AGG	Diamine Brilliant Blue G
Diamine Fast Orange EG,	Diamine Fast Blue
ER	FFB, FFG, G, BN
Union Fast Orange G, R	Diamine Blue RW
Diamine Orange G, D, B	Diamine Steel Blue L
Diamine Rose BD, GD, FFB	Diaminogene B, extra
Direct Rose T	Diamine Green B, G, CL,
Diamine Scarlet B, 3B	FG, BO
Diamine Fast Scarlet GG,	Diamine Dark Green N
GFF, 4BFF, 4BFS, 7BFF,	Diamine Brown 3G, M, MR, B
8BF, 8BN, 10BF	Diamine Fast Brown
Diamine Brilliant Scarlet S	G, R, GB
Diamine Red 5B, 10B	Diamine Catechine G, B
Diamine Purpurine 3B, 6B	Oxy Diamine Brown 3GN
Diamine Fast Red F	Diamine Black RO, BH, HW
Diamine Brilliant Rubine S	Oxy Diamine Black BM,
Diamine Fast Bordeaux 6BS	S000, SA, A, JE, JEI,
Diamine Brilliant	JB, JW, JWF
Bordeaux R	Para Diamine Black B, BB,
Diamine Fast Violet BBN	FFB, FFD extra conc.,
Diamine Violet N, BB, RB	BF extra conc.
Oxy Diamine Violet B, G, R	Diamine Fast Black X, XN
Diamine Heliotrope B, G, O	extra conc, F, CB high
Oxy Diamine Blue G, 3G, 5G	conc., C high conc.
	Union Black S, BG, BB, 3B.

*Neutral-Dyeing Wool Dyestuffs.*

Indian Yellow G, R, FF	Brilliant Milling Green B
Tropaeoline OO	Tetra Cyanole A
Orange extra, ENZ, EN, R	Lanacyl Blue BB, R
Croceïne AZ	Lanacyl Violet B, BF
Roccelline	Lanacyl Navy Blue B
Milling Red G, Wool Red	Alphanol Blue GN, 5RN,
B, BG	BR extra
Rosazeïne B, 13, Irisamine G	Naphtylamine Black
Formyl Violet S4B, 6R, 8B,	4B, 6B, X3B
10B, HW	Alphanol Black BG, R, 3BN
Acid Violet 6BS	Neutral Wool Black B, 4B.
Brilliant Milling Blue B	

The *dyeing of previously mercerised goods* is carried out according to the one-bath method either in a neutral or in a weakly acid bath, for which purpose any of the dyestuffs suitable for union dyeing (see page 314 and succeeding pages) may be employed. As the cotton portion of such goods readily absorbs the dyestuff, the boiling must be continued rather longer than usual in order that the wool portion may be dyed a sufficiently deep shade, the quantity of wool dyestuff being at the same time increased if necessary; the quantity of Glauber's salt may be reduced to about 1 lb per 10 gallons liquor.

For goods which are *mercerised after the dyeing*, the above dyestuffs (p. 294) are the best suited, as they resist the mercerising process fairly well.

*Shot effects* are sometimes required on crimped goods; after mercerising the goods, the wool is dyed in an acid bath with easily levelling dyestuffs, and, after rinsing well (best in water containing a little ammonia or soda), the cotton is dyed in a cold to lukewarm bath with Diamine Colours, an addition of Glauber's salt and a small quantity of soda. The Diamine Colours best suited for this manner of working are enumerated on page 269. In order to enhance the brightness of shade, the dyeings are finally rinsed in water slightly acidulated with acetic acid, or, if found desirable, topped slightly with Basic Colours.

Shot effects can furthermore be obtained by first dyeing the wool in an acid bath, then mercerising, and finally dyeing the cotton.

In addition to the neutral-dyeing colours mentioned on page 295, the following wool dyestuffs may in this case also be used:

Naphtol Yellow S	Azo Wool Violet 7R
Acid Yellow AT	Cyanole extra
Brilliant Cochineal 2R, 4R	Tetra Cyanole V, A
Scarlet FR, F3R, EC	Indigo Blue N, SGN
Naphtol Red EB	Brilliant Naphtol Blue B, R
Lanafuchsine SG, SB	Azo Fast Blue B, BD
Brilliant Lanafuchsine BB	Fast Acid Green BN
Azo Rubine A	Cyanole Fast Green G
Amaranth B	Naphtol Black 2B
Azo Orseille C	Naphtylamine Black S
Crystal Scarlet 6R	Naphtylamine Blue Black B.
Eosine GGF	

For goods with a black cotton ground on the other hand, the cotton is first dyed with Diamine Black BH at about 50° C. (120° F.), with the addition of 2 lbs Glauber's salt and  $\frac{3}{4}$  to 1½ oz soda per 10 gallons liquor, then rinsed, and diazotised and developed with Phenylene Diamine, the wool being finally dyed in an acid bath.

### Union Astrachan

usually consists of a cotton ground and a woollen pile curled by a special treatment.

These goods are dyed with Diamine Colours in combination with wool colours according to the one-bath process, and in order to preserve the bright appearance of the curls as much as possible, it is best to dye in a weak acid bath (see page 254) or to dye with Duatol Colours.

It is best to commence at about 50° C. (120° F.) and to raise the temperature gradually until the wool is dyed to the right depth, which is usually attained below boiling temperature.

A solid shade on the two fibres is not required, it being sufficient to dye the cotton a little deeper than the wool.

It is advisable after rinsing to treat in water slightly acidulated with acetic acid, and for bright shades to top with Basic Colours in accordance with the directions given on page 275.

When cotton dyed black fast to acids has been interwoven, as is sometimes the case, only the wool is subsequently dyed deep shades with Acid Colours. This method presents the advantage of yielding the brightest pile and is easy to carry out because as already mentioned it is not as a rule necessary for the wool and cotton to be the same shade, a black ground sufficing in the case of dark shades.

When the cotton has been dyed with Immedial Black or Immedial Carbon, the goods after being cross-dyed have to be treated with acetate or formate of soda in accordance with the directions on page 348.

The lustre of the goods may be enhanced by applying a thin solution of British gum and glycerine on a finishing machine, then drying, and finally steaming for about  $\frac{1}{2}$  hour at 15 lbs. The British gum is then removed by rinsing with water, hydroextracting, and drying.

### Mohair Plush.

The goods prepared by raising, steaming and cropping are degreased by a thorough washing in a washing machine without squeezing rollers or provided with light ones only in a soda and soap bath of 30—40° C. (85—105° F.) for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour, and are then rinsed well in clear water.

For the dyeing, a distinction is drawn between the following qualities:

- a) Goods with a grey back,
- b) Goods with a cotton or a cotton and linen back dyed fast to acids.

#### *a) Goods with a Grey Back.*

*Pale shades* are mostly dyed by the one-bath method as customary for union goods, but in order to keep the pile in as good a condition as possible, only very little Glauber's salt is added to the dye-bath, the dyeing being carried out in as short a time as possible and without boiling (at about 70° C. (160° F.)

In order to dye the wool a sufficiently deep shade, the Diamine Colours of Group 3 or of Groups 1 and 2 in com-



bination with wool colours should mainly be employed. The absorption of the dyestuffs by the wool is assisted by using a weakly acid bath (with an addition of 0.5—1% acetic acid or 3—5% salammoniac), the quality of the plush being thereby also kept in a better condition.

The dyed goods are to advantage soured off in a weak acetic acid bath.

Medium and deep shades for so-called "Polar Bear Plush" are likewise as a rule dyed by the one-bath method, the Duatol Colours being preferred for the purpose, or the dyeing is done with Diamine Colours in a weakly acid bath.

Dark shades on *upholstery plush* are dyed by the two-bath method, the wool being first dyed with Acid Colours in the customary manner; after thoroughly rinsing the goods, the cotton or linen back is then dyed with Diamine Colours in a cold to lukewarm bath as described on page 268, or with Basic Colours on a tannin and antimony or sumac and iron mordant as indicated on page 275.

Since by cotton dyeing with Diamine Colours better fastness to rubbing is ensured than by the application of Basic Dyestuffs, the former will be used to advantage particularly for plush for upholstery work etc.; only for very bright shades, and for dark and rich dyeings on plush with woven designs which cannot be obtained in the required depth and brightness with Diamine Colours, will Basic Colours be found indispensable.

The dyeing may be carried out by the two-bath method with Diamine Colours by first cotton-dyeing with the Diamine Colours indicated on page 270 and wool-dyeing in an acid bath with the addition of alumina salts.

After dyeing (best at full width), the goods are cooled at once in a rinsing beck filled with cold water, and finally rinsed once more very thoroughly in the washing machine. If the fastness to rubbing is then insufficient, the plush is treated in the following manner:

Charge a cold bath in the washing machine with a sufficient quantity of glue solution to give it a slightly sticky feeling, then gradually add a little silicate of soda in solution until a slightly alkaline reaction sets in, run the goods for about 20 minutes, rinse well with fresh water, hydroextract, and dry.



*Goods with a Cotton or Cotton and Linen Back  
Dyed Fast to Acids.*

This class of goods is dyed in a much simpler way than that described under (a), since it is only necessary in this case to dye the mohair pile, which almost without exception is done with Acid Colours. In accordance with the quality of the goods to be dyed, dyestuffs of good fastness to light are usually employed. (See tables for wool piece-dyeing on pages 108—121).

For *Red on upholstery plush* (especially for railway carriages), *Diamine Fast Red F* is frequently used and appreciated for its very good fastness to light, perspiration and rubbing. Charge the bath at 40—50° C. (105—120° F.), according to the depth of shade to be obtained, with 1 to 2½% Diamine Fast Red F, 10% Glauber's salt and 2 to 5% acetic acid, enter the goods, and raise gradually to the boil, adding another 2 to 3% acetic acid after ½ hour's boiling if necessary in order to exhaust the liquor. After another ½ hour's boiling, add 3% chromium fluoride, run for another ½ to ¾ hour, and finally rinse well.

The dyed goods are rinsed well and if necessary treated as under (a) in order to improve the fastness to rubbing.

Goods containing cotton dyed with Immedial Black or Immedial Carbon should before drying be treated with formate or acetate of soda in accordance with the directions on page 348.

The lustre of the plush may be enhanced by brushing—on either by hand or by means of a suitable machine, a solution of

40 lbs British gum	} per 10 gallons liquor
10 lbs wheat flour	
2 pints glycerine	
½ pint acetic acid	

The plush is then dried, steamed for about 1 hour, washed well in the washing machine, hydroextracted, and dried.

### Union Hosiery.

In the dyeing of union hosiery it is more important than with most other union fabrics to see that solid shades are obtained on the wool and cotton, differences in shade between the two fibres being particularly prominent on such goods.

In order to prevent the cotton from showing up, it is advisable to dye it somewhat deeper than the wool and preferably to employ the dyestuffs of Group 2, especially for mode shades.

For the production of *Blacks*,

Diaminogene B or

Oxy Diaminogene OT

with the addition of a little

Formyl Violet 10B for more bluish blacks, and

Naphtylamine Black 4B, 6B for deeper shades of black, in a bath slightly acidulated with acetic acid, are greatly in favour in practice. Dye with 2 lbs Glauber's salt crystals per 10 gallons liquor and 1 to 2% acetic acid of 8° Tw. near boiling temperature, rinse, diazotise, and develop with Beta Naphtol and Phenylene Diamine (see page 267).

As direct-dyeing *Blacks of good fastness to washing and light*,

Union Black J, SB

or combinations of

Diamine Fast Black XN extra conc., C. high conc.,  
CB high conc,

Alphanol Black BG, R, 3BN. K4BN, KV

Naphtylamine Black 4B, 6B

may be recommended, and for cheap blacks much in use the various brands of Union Black, viz. P, BG, BB, 3B, 1993 J. etc., Union Jet Black B, GB, also the Oxy Diamine Black brands JE, JEI, JB, JW, JWF in particular. The fastness to washing of these direct dyeing blacks is improved by an aftertreatment with formaldehyde or formaldehyde and bichromate of potash. (Page 264).

For *colours*, the combinations mentioned in the tables of page 314 and succeeding pages are used.

For *Navies*, combinations of the following dyestuffs are specially well suited:

Union Dark Blue KN

Diamine Black BH, BHIN, BHF

Diamine Heliotrope B

Oxy Diamine Blue G, 3G, PB, PR

Diamineral Blue CV, CVB

Oxy Diamine Black JW, JWF, FFC, A, SA

Lanacyl Navy Blue B, BB

Alphanol Blue GN, 5RN, BR extra

Formyl Violet, all brands

Formyl Blue B.

For *Tan shades* on stockings which are greatly in favour,

Union Brown 1926J, 2089J

Diamine Brown No. 33, may be used,

or combinations of these products and

Diamine Orange B

Diamine Catechine 3G

Diamine Brown 3G

Union Black S

Diaminogene B, extra

Direct Grey 2207J

Diamine Fast Yellow B, FF, A. M, FR

Lanacyl Blue BB, R

Naphtol Blue Black.

For dyeings possessing particularly good fastness to washing, the goods are sometimes cotton-dyed with Im-medial Colours as indicated on page 273, being wool-dyed subsequently with Acid Colours fast to washing.

For the production of dyeings possessing good fastness to washing and perspiration, hosiery goods are also dyed according to the diazotising process, especially blacks, dark blues and reds, by first cotton-dyeing with diazotisable products, and then wool-dyeing with suitable Acid Colours.

The following for instance are used:

*For Blacks:*

Diamine Black BH, BHF, BHN

Diaminogene B

Oxy Diaminogene OT, OB

Diamine Neron BB

} diazotised, and deve-  
loped with Phenyl-  
lene Diamine or with  
Phenylene Diamine  
and Beta Naphtol

*For Blues:*

Diamine Black BH, BHF, BHN

Diaminogene Blue NB, NA, 3RN

} diazotised and developed  
with Beta Naphtol

*For Reds:*

Diamine Azo Scarlet 4BL extra

6BL extra, 8B extra

Diamine Azo Bordeaux B

} diazotised and deve-  
loped with Beta  
Naphtol

The dyeing is carried out in a bath of 50—60° C. (120—140° F.) with the addition of Glauber's salt and some soda, whereupon the goods are rinsed, diazotised and

developed according to the directions on page 267, and once more well rinsed, the wool being then dyed with suitable Acid Colours (see the chapter on The Dyeing of Woollen Piece-Goods, pages 108—121).

For cross-dyeing the wool, it is advisable to use formic or acetic acid instead of sulphuric acid or bisulphate whilst adding at the same time about 3% sulphate of alumina or 5% alum to the acid bath.

### Union Felts.

Union felts are almost invariably dyed by the one-bath method, which in some cases is followed by topping with Basic Colours in a weak acid bath (see page 275) in order to increase the brightness of the shade. Particularly bright shades are produced by the two-bath method, by wool-dyeing with Acid Colours and cotton-dyeing subsequently with Basic Colours on a tannin and antimony mordant.

As is the case with the majority of union goods it is necessary to keep the cotton a somewhat deeper shade than the wool.

In consideration of the generally low quality of the goods, cheap dyestuffs are as a rule employed, especially for deep shades, and prolonged boiling or dyeing for any length of time should be avoided as much as possible in view of the lack of resistance of these usually thin felts. If the wool has not attained the required depth of shade after boiling for some time, wool colours are added in order to avoid prolonged boiling.

The Diamine Colours suited for this purpose are principally those of Group 1, as also combinations of the dyestuffs enumerated in the tables on page 314 and following pages.

For *Scarlet shades* frequently in demand on felts,

Diamine Scarlet B

Diamine Red 4B

Diamine Scarlet GG, GFF, 4BFF

shaded with

Rosazeïne B

Orange extra, ENZ

Diamine Orange G, D

are used according to the one-bath process.

*Tan shades*, for which there is likewise a frequent demand, are produced with the same combinations of dyestuffs as mentioned above under the heading of "Union Hosiery".

Bright green and violet shades are obtained in a simple manner,

*Green with*

Thioflavine S or  
Oxy Diamine Yellow TZ, GG  
in combination with  
Naphtaline Yellow  
Brilliant Milling Green B  
and topped with  
Brilliant Green Crystals extra  
Thioflavine T.

*Violet with*

Oxy Diamine Violet B, R  
Diamine Violet N, BB  
Diamine Brilliant Violet B, RR  
Diamine Fast Violet BBN  
Oxy Diamine Blue G, PR  
Diamine Brilliant Blue G  
in combination with  
Formyl Violet S4B, 4BF  
Croceïne AZ  
and topped with:  
Methyl Violet 6B—4R  
Crystal Violet 10B.

Bright Medium Blues are obtained according to the two-bath process by dyeing the wool with

Cyanole extra, FF  
Tetra Cyanole V, extra  
Acid Violet 6BS

and subsequently cotton-dyeing in a fresh cold to warm bath with

Methyl Blue for Cotton  
Blue JB, JBP  
Pure Soluble Blue  
Water Blue B

with the addition of 1 lb Glauber's salt and 1 lb alum per 10 gallons liquor. The goods are well and evenly squeezed off, or whizzed, and dried without rinsing.

### Union Braids and Brush Braids.

Woven tapes or braids are singed, steamed on the steaming cylinder and finally scalded in boiling hot water. After cooling, the goods are made up in hank form, washed with soda or ammonia and soap, rinsed, and dyed.

These goods are dyed like other union fabrics according to the one-bath method in a neutral Glauber's salt bath with the dyestuff combinations given in the tables on page 314 and succeeding pages, following the manner of working described on page 252.

Solid shades on the wool and cotton are particularly required for union brush braids, and for this class of goods, dyestuffs of Group 1 (pages 248 and 250) are therefore principally selected which dye wool and cotton as solid as possible. For the sake of the appearance of the goods it is well to dye the cotton a little deeper than the wool, the same tone being however maintained.

Pale, bright shades are best dyed without boiling, at a temperature of 70—80° C. (160—175° F.); very bright and pure tones are obtained by stoving after dyeing. (For recipe see pages 282—284).

In some cases, particularly for the production of bright and full tones, braids may also be dyed by first wool-dyeing in an acid bath and cotton-dyeing subsequently with Basic Colours on a mordant of tannin and antimony (see page 275).

### Shoddy Cloths with Cotton Warp.

Union shoddy piece-goods are generally manufactured from either carbonised or non-carbonised shoddy weft and a cotton warp, being then dyed either according to the one-bath or the two-bath method, whichever yields the desired shade most easily on a ground which in the case of such goods is usually dark.

When working in two baths, the wool can either be dyed first, the cotton being dyed subsequently with Diamine Black RMW, or the goods are cotton-dyed first with a black fast to acids (either in the dye-beck or in the milling machine (see pp. 270—271) and wool-dyed subsequently.

In order to produce as light shades as possible on a dark ground, the coloured material is frequently stripped, for which purpose bichromate of potash and sulphuric acid, or Hyraldite, are generally employed.

The various methods of stripping are described on pages 43—45.

*One-Bath Method for Shoddy Cloth.**a) Neutral Dyeing.*

When working according to the one-bath method, it must be remembered that shoddy absorbs the dyestuffs more readily than other qualities of wool, and that the wool, which is generally dark coloured, requires less dyestuff than the cotton contained in the cloth, which is frequently undyed. In order to cover the cotton sufficiently, it is advisable to use those Diamine Colours which dye the cotton more strongly than the wool (Group 2, pages 248 and 250) and to commence dyeing below boiling temperature, only raising to the boil in case the wool has not assumed a sufficient depth of shade at a lower temperature.

Material previously stripped in an acid bath should be neutralised well with soda and rinsed before being entered into the dyebath. If vats are used for the dyeing which have previously been employed for acid dyeing or stripping, they must be boiled out beforehand with soda.

With a view to obtaining bright and even shades on shoddy goods by the one-bath method, the dyeing is frequently carried out by first boiling for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour with neutral-dyeing wool colours with the addition of Glauber's salt, and running for  $\frac{3}{4}$  to 1 hour in the cooling bath. This method of working is of particular advantage for blue, as the black dyestuff used for covering the cotton is thus prevented from going on to the wool, so that brighter results are obtained in this manner than according to the ordinary method of working. The brightest shades are obtained by using such dyestuffs for the cotton as have only little tendency to go on to the wool, such as Union Dark Blue KN, Diamine Black BH, BHF, RMW, Oxy Diamine Black KW, NF. Diamine Colours suited for Colours in this connection are given on page 248.

Most shoddy styles, more particularly those containing a good deal of cotton, or of cotton difficult to dye, are dyed by the one-bath method in a neutral bath with the addition of Glauber's salt only, while better-class goods on the other hand may also be dyed weakly acid as given below.

*b) Dyeing in a weakly acid bath.* In the same way as when dyeing neutral, it has here to be observed particularly that the wool very readily absorbs the dyestuffs, so that the dyeing must be commenced at a moderate temperature. The dyeing is carried out in accordance with the general directions on page 254, the goods being entered



lukewarm, the temperature raised gradually to 70—80° C. (160—175° F.) and the goods run at this temperature for ½ hour. If the wool by this time is not sufficiently covered, the temperature may be raised to near boiling point. With the exception of Black, which requires ½ to 1 hour's boiling, it is not, as a rule, necessary to boil.

*Black* is produced when applying this process with

4—6 % Oxy Diamine Black JW extra conc.

2—2.5 % Naphtylamine Black 4B

0.5 % bichrome

2 % acetic acid

20—30 % Glauber's salt crystals.

Enter the goods into the hot bath, raise gradually to the boil, boil according to requirement for ½ to 1 hour, leave them to feed for some time in the cooling bath, and finally rinse well.

## 2. Two-Bath Method for Shoddy Cloth.

*a) Acid-dyeing the wool first and cotton-dyeing subsequently.* This method of working is applied a great deal, particularly for very dark shoddy goods; brighter results are obtained in this manner than when dyeing in one bath, coloured wool being stripped to some extent by the acid dyeing and greater uniformity and brightness of shade being obtained thereby.

Dye with Acid Colours as usual, and on exhaustion of the bath add another 6—8 % sulphuric acid, boiling hereafter ½ to ¾ hour longer.

After the acid-dyeing, rinse, and then cotton-dye in a cold to lukewarm bath, best in the dolly; see page 268.

When stripping shoddy goods before the dyeing by boiling with bichrome and sulphuric acid, certain dyestuffs may be added straight to such stripping bath.

The following may be applied to advantage:

Naphtol Yellow S

Fast Yellow S

Acid Yellow AT

Indian Yellow G, R, FF

Orange extra, II. EN, ENZ

Scarlet FR, F2R, F3R

Brilliant Cochineal 2R, 4R

Brilliant Orseille C

Azo Orseille BB

Acid Magenta

Acid Violet 4RS, 6BS

Formyl Violet 10B, S4B

Alkaline Violet C, CA

Acid Green extra conc.

Acid Green extra conc. B

Fast Acid Green BN

Brilliant Milling Green B

Cyanole Fast Green G

Cyanole FF, extra, GG

Tetra Cyanole V, SF,

Formyl Blue B [extra, A

Brilliant Milling Blue B.



*b) Cotton-Dyeing first, with subsequent Wool-Dyeing.*  
The cotton may be dyed first either with direct-dyeing dyestuffs as indicated on page 270 or with Diamine Colours subsequently diazotised and developed or coupled, or again with Immedial Colours (see pages 271—274).

The method of dyeing the cotton portion of shoddy goods first is usually applied in the case of dark shades, principally of Blacks, and sometimes also of deep Blues, Browns and Greens.

The Diamine Colours for the cotton are dyed either in a bath of 50—60° C. (120—140° F.) or by the milling process. The quantities required for the starting bath when dyeing *black in the beck* are for instance as follows:

- 5—6% Para Diamine Black B, BB, FFB or  
Oxy Diamine Black SA, UI, US etc. or
- 3—4% of the concentrated brand of these products,  
and also of Diamine Milling Black B conc.,  
FG extra, FFB extra conc.

Dye for 1 hour with the addition of 2 lbs Glauber's salt crystals and 1½ oz soda per 10 gallons.

For dyeing by the *milling process*, approximately

- 1—1½% Diamine Milling Black B conc., FG extra,  
FFB extra conc.

is required. these dyestuffs being applied in accordance with the indications on page 271.

The previous dyeing of the cotton in the case of Blue, Brown or Green is carried out in the same way as for Black, either in the beck or by milling with  
*for Blue:*

Diamineral Blue R and Para Diamine Black,

*for Brown:*

Diamine Nitrazol Brown B or G,

*for Green:*

Diamine Nitrazol Green BB, GF

coupled with  
Nitrazol C according  
to directions  
on page 265.

The grounding of the cotton with Immedial Colours is done in the jigger as described on page 273.

For the *subsequent wool-dyeing*, any dyestuffs suitable for piece-goods may be used, for instance

*for Black:*

- Naphtylamine Black 4B, 6B, S, 4BS, ES3B, ESN etc.
- Naphtylamine Blue Black B, 5B,
- Naphtol Black B, 3B, 6B etc.

*for Dark Blue:*

Azo Wool Blue SE, SER  
Azo Navy Blue B, 3B  
Acid Navy Blue A  
Brilliant Naphtol Blue B, 4B, R  
Formyl Violet, all brands  
Acid Violet 6BS.

*for Brown, Green and Olive, combinations of*

Cyanole Green B, 6G  
Lanafuchsine SB, SG  
Naphtol Red EB, C  
Azo Wool Violet 7R  
Orange extra, II, IV  
Acid Yellow AT  
Indian Yellow G, FF  
Tropaeoline OO.

The cross-dyeing with Acid Colours of the goods previously cotton-dyed is carried out in the well-known manner with the addition of bisulphate of soda or with sulphuric acid, whereby special care has to be taken, when direct-dyeing Diamine Colours have been used for the grounding, that the bath is charged with the requisite quantities of dyestuff and all the acid or bisulphate of soda required for exhausting the dyestuff before the goods are entered. It is moreover advisable to add about 5% alum. Enter the goods warm, raise gradually to the boil, and boil gently until the liquor is exhausted. The dyebath should be distinctly acid right from the commencement, because the cotton dyestuff which has been dyed direct in a neutral bath will otherwise easily come off the fibre again with the boiling.

### Union Yarns.

For union yarns similar combinations of dyestuffs are used as for piece-goods; in view of the fact that yarns are frequently subjected to a washing process, products of good fastness to washing should be used for shading the wool, for instance Milling Yellow O, Anthracene Yellow C, Milling Red G, Wool Red B, BG, Formyl Violet (all brands), Formyl Blue B, Brilliant Milling Blue B, Brilliant Milling Green B, Tetra Cyanole A, Rosazeine B, Irisamine G. If the fastness to washing and milling of the direct dyeings is not sufficient, such dyestuffs should be selected for dyeing as become fixed faster by an aftertreatment (see pages 262—267); or, the dyeing may be carried out by the two-

bath method with Wool Colours fast to milling and Immedial Colours, by which means the best fastness with respect to both light and milling may be obtained (see methods on page 273 and also tables on page 314 and following pages); see also our special card No. 2949, "Dyeing on Union Yarn".

*Black* is more in demand than any other dye, and may be obtained cheaply and in good fastness to milling with

Oxy Diamine Black JE, JEI, JB, JW, JWF

Oxy Diamine Black US, UI

Para Diamine Black B, BB, FFB, FFD extra conc.,  
BF extra conc.

Diamine Aldehyde Black B conc., BB conc.

in combination with

Alphanol Black BG, R, 3BN

aftertreated with 3% formaldehyde and 1% bichrome.

If fastness to acids is required at the same time,

Oxy Diamine Black JW

coupled with Nitrazol C (directions on page 265) is used for dyeing.

*Black of good fastness to milling and light* is produced with

Diamine Jet Black SS

in combination with

Alphanol Black BG, R, 3BN

Anthracite Black B, R

aftertreated with 3% bichrome, 1—2% acetic acid, or with

Diamine Aldehyde Black B conc., BB conc.

Diamine Fast Black XN extra conc., CB high conc.,  
C high conc.

shaded with

Alphanol Black BG, R, 3BN

Anthracite Black B, R

aftertreated with 3% formaldehyde and 1% bichrome.

Fine, deep shades of *Black of good fastness to milling and light* may also be obtained with

Diaminogene B or Diamine Black BH

in combination with

Alphanol Black BG

diazotised, and developed with Phenylene Diamine.

*In order to obtain best fastness to light and milling*, Chrome Colours in combination with Immedial Black or Immedial Carbon should be used as described on pages 273 and 274.

**Uncarbonised Shoddy, Wool Waste, Rags etc.**

In the dyeing of shoddy, a distinction is drawn between material free from cotton, i. e. carbonised material, and such containing vegetable matter, particularly cotton.

In order to save the expense of carbonising and to obviate the loss of weight incurred thereby, the vegetable matter contained in the latter material must be dyed the same shade and depth as the wool.

Rags and similar waste still in the unopened state are sorted before dyeing according to quality and colour in order to suit them to the ground colour best fitted for the shade to be dyed. By this means, a previous stripping of the material is in many cases saved, which would otherwise be indispensable in order to obtain the desired shade.

**Stripping of Shoddy.**

In such cases where the ground shade is dark and it is found necessary to produce light shades thereon, the dark ground is removed as much as possible before dyeing, by means of suitable stripping agents; those used most frequently are described on pages 43—45. After the stripping, the goods must be very thoroughly rinsed in cold and warm water, and if the subsequent dyeing is to be carried out with Diamine Colours, the stripped material must first of all be neutralised. After neutralising, the goods are again rinsed thoroughly.

When dyeing stripped shoddy with Chrome Colours, it is often found that the stripped ground shade returns more or less distinctly, particularly if it was originally blue or green. In such cases it has been found very useful to give the material a vigorous treatment with soda and to rinse it well before stripping with Hyraldite. It is moreover advisable not to re-dye with Chrome Colours but to use Acid Colours fast to milling or Diamine Colours for the purpose.

In order to destroy the ground shade as much as possible, it is sometimes necessary before stripping with Hyraldite to treat the material with bichrome and sulphuric acid at the boil.

## Dyeing according to the One-Bath Method.

When dyeing uncarbonised shoddy containing cotton according to the one-bath method, the way of procedure as a rule is the same as for dyeing Union goods, viz. with Diamine Colours in combination with Wool Colours in a short bath with the addition of 10% Glauber's salt crystals in the case of light shades, and of 20—30% in the case of medium and dark shades, according to the method indicated for neutral dyeing (see page 252).

In view of the fact that shoddy as a rule absorbs the dyestuff more easily than other wool, and that wool which is already coloured requires less dyestuff than the cotton worked up with the same, which is usually either white or of a light colour, it is advisable to use Diamine Colours of the second group as a rule, and to start dyeing near boiling temperature. If the wool is hereby not dyed a sufficient depth of shade, the temperature is raised to the boil, boiling being maintained until the wool is sufficiently covered.

For producing dyeings *fast to milling*, dyestuffs are used which can be fixed with better fastness by a suitable aftertreatment (see pages 262—267).

The aftertreatment may be carried out by using metallic salts or formaldehyde, either in the dyebath or in a fresh liquor. It is carried out in the dyebath only if the latter is not to be kept, whilst in the contrary case a fresh bath must be prepared.

*Black* is dyed more frequently any other shade, the following dyestuffs coming into consideration:

Oxy Diamine Black JEI, JB, JW, JWF

Oxy Diamine Black SA. US, UI

Oxy Diamine Carbon FFG, JE, JEI, JB

Union Black OJGJ

Para Diamine Black B, BB, FFB, OAKH, BF extra conc.

Diamine Fast Black XN extra conc., C high conc.  
CB high conc.

Diamine Aldehyde Black B conc., BB conc.

which are either dyed direct or are aftertreated with formaldehyde and bichrome.

*For Dark Blue:*

Para Diamine Black B, BB, FFB, BF extra conc. or  
Oxy Diamine Black SA, A

in combination with

Formyl Violet, all brands

Brilliant Milling Blue B

Brilliant Milling Green B

Formyl Blue B

and, same as Black, aftertreated with formaldehyde and bichrome.

For *dyeing blacks fast to milling on wool waste* containing not too large a proportion of cotton, the following method is frequently applied:

Dye with

$2\frac{1}{2}$ — $3\frac{1}{2}$  % Oxy Diamine Black US or UI

in combination with

2 — $2\frac{1}{2}$  % Anthracene Chrome Black F, FE etc., or  
Anthracene Acid Black DSN, DSF, DNG

for  $\frac{3}{4}$  to 1 hour near boiling temperature with the addition of 20—30% Glauber's salt crystals, gradually add 2% sulphuric acid whilst if necessary increasing the volume of the bath, raise to the boil, boil for  $\frac{1}{2}$  hour, add 1% bichrome or 1% bichrome and 3% formaldehyde, and boil gently for another  $\frac{1}{2}$  hour. Hereafter rinse thoroughly.

*Dark Blue* may be produced in the same manner by dyeing Oxy Diamine Black SA in combination with Formyl Violet, and applying the same aftertreatment as for Black.

For *Colours*, the combinations given in the tables on pages 314—329 are used.

Union Shoddy may be dyed by the one-bath method in a *feebly acid liquor* (see page 254) with the addition of either Glauber's salt or ammonia salts or of a slight quantity of acetic acid, a little bichrome in such case being frequently also added to the bath, 0.25—1% according to the depth of the shade to be dyed. Dyeings of better fastness to washing are obtained in this manner in the case of certain dyestuffs, but only with material which offers no difficulty whatever with regard to covering of the cotton is it recommended to work in an acid bath; otherwise it is preferable to dye in a neutral bath, which is the case also with rags difficult to penetrate.

For dyeing Blacks on shoddy which contains silk in addition to cotton, Oxydiamine Black JW, JWF, are best suited. Dye as in the case of unions with the addition of 20% Glauber's salt crystals, enter into the bath which has been previously brought to the boil, treat without steam for  $\frac{1}{2}$  hour, then boil gently for  $\frac{1}{2}$  hour, finally leaving the goods to feed for  $\frac{1}{2}$  hour in a cooling bath. The fastness to milling of the dyeings, in itself good, may be still further enhanced by an aftertreatment with formaldehyde and bichrome or by coupling with Nitrazol.

It is well to add a little soda (0.2—0.3%) to the dye-bath when dyeing goods which have not been previously scoured and may still contain slight quantities of oil or grease.

### Two-Bath Method.

Uncarbonised shoddy is dyed by the two-bath method with a view to obtaining the best possible fastness to milling; for this purpose the wool is dyed with Acid Colours of good fastness to milling or with Chrome Colours, the cotton being covered with Immedial Colours. The method of working may also be reversed, the cotton being dyed first and the wool subsequently.

Regarding the dyeing of the wool see the tables for Wool Dyeing, pages 24—37. The covering of the cotton is effected in accordance with the directions on page 274.



# DYESTUFFS FOR GREY AND FOR MODE SHADES

a) Simplest Method of Production	b) Of Better Fastness to Light
<p style="text-align: center;"><u>One-Bath Combinations:</u></p> <p>Oxy Diamine Black FFC, JE,                                            JEI, JB, JW, JWF          Para Diamine Black B, BB,          Union Black S                   [FFB          Union Dark Blue KN          Diamine Black BH, BHN,            BHF          Direct Grey 2207J          Diamine Catechine B, 3G          Diamine Brown M          Diamine Orange B, G, D          Diamine Fast Yellow                                            B, M, FR, FF          Diamine Bordeaux B</p> <p style="padding-left: 40px;">shaded if necessary with neutral-          dyeing dyestuffs.</p> <p style="text-align: center;"><u>For Feebly Acid One-Bath Dyeing</u>          (page 254):</p> <p>Diamineral Blue B, BB, BF, R          Diamine Black BH, BHF, BHN          Diamine Fast Orange EG, ER          Union Fast Orange G, R          Union Fast Brown R          Diamine Fast Brown G, R          Diamine Fast Yellow A, AGG,                                            B, FF, M, FR          Diamine Fast Scarlet                                            GFF, 4BFF</p>	<p style="text-align: center;"><u>One-Bath Combinations:</u></p> <p>Diamine Fast Black X, F          Diamine Jet Black SS          Diamine Dark Blue B          Diaminogene B, extra          Union Fast Grey G, BR          Union Fast Green BB          Union Fast Brown R          Union Fast Orange G, R          Diamine Fast Blue                                            FFB, FFG, G          Diamine Fast Brown G, R, GB          Diamine Fast Orange EG, ER          Diamine Fast Yellow A, AGG,                                            B, FF, FR, M          Diamine Fast Bordeaux 6BS.</p> <p style="text-align: center;"><u>Dyeing weakly acid (page 254):</u></p> <p>Diamine Fast Blue                                            FFB, FFG, G          Diamine Fast Orange EG, ER          Diamine Fast Brown G, R          Union Fast Orange G, R          Union Fast Brown R          Diamine Fast Yellow                                            A, AGG, B, FF.</p> <p style="text-align: center;"><u>Two-Bath Dyeings:</u></p> <p style="padding-left: 40px;">Preliminary dyeing with Acid          Colours according to particulars on          page 108. Subsequent cotton-dyeing          with</p> <p>Diamine Fast Yellow A, AGG,          Diamine Fast Orange ER [FF          Diamine Fast Brown G, R          Diamine Fast Blue FFB          Diamine Fast Bordeaux 6BS.</p>



# ON UNIONS (PIECE-GOODS), HANKS AND LOOSE MATERIAL.

## c) Of Good Fastness to Milling

For light shades, the Diamine Colours named sub (a) and (b) will suffice, while for medium and dark shades, combinations of the following dyestuffs aftertreated with metallic salts are used:

Diamine Fast Yellow B, FF  
Oxy Diamine Yellow CR  
Diamine Orange B  
Diamine Catechine B, 3G  
Diamine Brown M, R, 3G  
Oxy Diamine Brown RN  
Diamineral Blue R, BF  
Diamine Dark Blue B  
Diamine Fast Black X, F  
Diamine Jet Black

SS, CR, RB

Diamine Fast Grey BN  
Union Black S

aftertreated with

bichrome  
acetic acid.

For shading the wool, the following are used:

Milling Yellow O  
Anthracene Yellow C  
Milling Red G  
Wool Red B, BG  
Formyl Blue B  
Brilliant Milling Blue B  
Brilliant Milling Green B  
Rosazeine B.

## d) Of Best Fastness to Milling and Light

The wool is dyed

### 1. According to the After-chroming

Process with

Anthracene Yellow BN, C, BG  
Anthracene Chrome Brown  
D, DW, DWN, SWN, SWR  
Anthracene Chrome Blue G, BB  
Anthracene Chrome Red A  
Anthracene Blue Black BE, BG  
Anthracene Chrome Black  
PPC extra  
dyed as per directions on pages 12/13.

### 2. According to the Chromate Process

with

Anthracene Yellow BN, C, BG  
Anthracene Chromate Brown  
EB, 3G, WS, WG  
Anthracene Blue Black C  
Chromate Blue Black B  
Anthracene Chromate Grey  
G, KB  
Anthracene Chromate Blue XR  
Anthracene Chromate Green  
KFF extra  
dyed as per directions on page 14.

The Cotton is covered with

Immedial Yellow Olive G  
Immedial Yellow Brown EN  
Immedial Cutch O, G, R, BG  
Immedial Brown W conc.,  
RR, B, G  
Immedial Dark Brown D conc.  
Immedial Olive B, 3G  
Immedial Black NN conc.,  
NNG conc., NF, NB, NBB  
Immedial Carbon B [conc.  
Dyed as per directions on page 274.

# DYESTUFFS FOR BROWN ON UNIONS

## a) Simplest Method of Production

### One-Bath Dyeings:

Union Dark Brown A  
 Union Brown TD, MP, 1926J,  
 2089J  
 or combinations of  
 Diamine Red 4B, 5B, 10B  
 Diamine Brown M, MR, R, 3G,  
 BWA, GWA, 30a, 40, 42a, 43  
 Oxy Diamine Brown RN, 3GN, G  
 Diamine Catechine G, 3G  
 Diamine Fast Yellow A, B, M, FR  
 Oxy Diamine Yellow CR  
 Oxy Diamine Black A, JB, JW,  
 JWF, FFC  
 Para Diamine Black B, BB, FFB.

For Feebly Acid One-Bath Dyeing  
 (page 254):

Diamine Fast Brown G, R  
 Diamine Fast Orange EG, ER  
 Union Fast Brown R  
 Diamine Brown M, 3G  
 Diamine Fast Scarlet  
 4BFF, GFF  
 Diamineral Blue R, B, 3B, BF  
 Diamine Black BH, BHF,  
 BHN.

### Two-Bath Dyeing:

Dyeing the wool first with Acid  
 Colours (page 110) and the cotton  
 subsequently with

Diamine Fast Brown R  
 Diamine Brown M, S, ATC  
 Diamine Nitrazol Brown G  
 Diamine Black RMW.

For shoddy goods, Diamine Black  
 RMW is mostly used by itself.

## b) Of Better Fastness to Light

### One-Bath Dyeings:

Diamine Fast Brown G, R  
 Diamineral Brown G  
 Diamine Brown M, B  
 Diamine Fast Red F, 8BL  
 Union Fast Brown R, G, RD  
 Union Fast Orange G, R  
 Diamine Fast Yellow  
 B, FF, M, FR  
 Diamine Yellow CP  
 Diamine Fast Grey BN  
 Diamine Dark Blue B  
 Diamine Fast Black X, F  
 shaded with  
 Naphtylamine Black 4B, 6B  
 Naphtol Blue Black  
 Indian Yellow G, R, FF  
 Orange extra, II, R, ENZ.

For the one-bath dyeing in a  
 weak acid bath, as well as for the  
 two-bath method the same dyestuffs  
 as stated sub (a) come into consi-  
 deration.

# (PIECE-GOODS, HANKS AND LOOSE MATERIAL).

## c) Of Good Fastness to Milling

### One-Bath Combinations:

Diamine Brown M, R, B  
Oxy Diamine Brown

G, RN

Diamineral Brown G

Diamine Catechine G

Oxy Diamine Yellow CR

Diamine Dark Blue B

Diamineral Blue

R, B, BF, 3B

Diamine Fast Red F

Diamine Jet Black SS

Union Black S

Oxy Diamine Black UI

Diamine Brown

MR, S, ATC

Diamine Catechine G

Diamine Fast Brown

R, G

Oxy Diamine Black

SA, JEL, JB, JW,

JWF, UI

Para Diamine Black

B, BB, FFB

Diamine Fast Black X

aftertreated with bichrome and  
acetic acid

aftertreated with formaldehyde  
and bichrome

For shading the wool:

Anthracene Yellow C

Brilliant Milling Green B

Tetra Cyanole A

Brilliant Milling Blue B

Formyl Blue B

Formyl Violet S4B.

## d) Of Best Fastness to Milling and Light.

The wool is dyed with

### 1. According to the After-Chroming

#### Process:

Anthracene Chrome Brown D,

DW, DWN, SWN, SWR

Anthracene Acid Brown G, N, B

Anthracene Chrome Red A

Anthracene Yellow

BN, RN, C, BG

Anthracene Chrome Blue G, BB

Anthracene Blue Black BE, BG

according to directions on pages  
12 and 13.

### 2. According to the Chromate Process:

Anthracene Chromate Brown

EB, ER, WS, WG, 3G

Anthracene Chrome Red G

Anthracene Yellow BN, RN,

C, BG

Anthracene Chromate Grey

G, KB

Anthracene Chromate Blue XR

Anthracene Blue Black C.

Dyed as per directions on page 14.

### The Cotton Covered with

Immedial Brown B, BR, RR,

G, W conc.

Immedial Cutch O, G, R, BG

Immedial Dark Brown D conc.

Immedial Dark Brown A

Immedial Red Brown 3R

Immedial Maroon B conc.

Immedial Black NN conc.,

NNG conc.

(Directions on page 274.)

### a) Simplest Method of Production

### One-Bath Dyeings:

Thioflavine S  
Oxy Diamine Yellow GG, TZ, CR  
Diamine Fast Yellow A, AGG, B, FF, M, FR, AR  
Diamine Yellow CP  
Diamine Orange B, G, D, F  
Oxy Diamine Orange G, R, RN  
shaded with  
Naphthaline Yellow Crystals  
Milling Yellow O  
Indian Yellow G, R, FF  
Tropaeoline G, OO  
Orange extra, II, R, ENZ, IV.

For Feebly Acid One-Bath Dyeing,  
any of the above-stated dyestuffs  
may be used.

A clear, bright Yellow is best produced with

Thioflavine S  
Naphtol Yellow S

with the addition of Glauber's salt crystals and acetic acid, as per directions on page 281.

### b) Of Better Fastness to Light

### One-Bath Dyeings:

Diamine Fast Yellow A, AR,  
AGG, B, 3G, FF, M, FR  
Diamine Yellow CP, N  
Diamine Fast Orange EG, ER  
Union Fast Orange G, R  
shaded with  
Fast Acid Yellow 3G  
Milling Yellow O  
Indian Yellow G, R, FF  
Orange extra, II, R, ENZ, IV.

For Feebly Acid One-Bath Dyeing,  
acid, any of the above-mentioned  
dyestuffs come into consideration,  
with the exception of Diamine Fast  
Yellow 3G.

For a clear Yellow as bright as possible, which however in this respect is inferior to the shades mentioned sub (a) and produced from Thioflavine S and Naphtol Yellow S.

\*Diamine Fast Yellow 3G  
is used.

\* Diamine Fast Yellow 3G is dyed in soft water with the addition of 10% phosphate of soda and some soap.

c) Of Good Fastness to Milling

One-Bath Dyeings:

Oxy Diamine Yellow CR  
Diamine Fast Yellow A

} aftertreat-  
ed with  
bichrome

\*Diamine Fast Yellow 3G,  
aftertreated with bichrome and  
copper sulphate yielding a Yellow  
of good fastness to light and  
milling.

Diamine Nitrazol  
Orange R

shaded with

Diamine Orange D

} coupled with  
Nitrazol C as  
per directions  
on page 265

Diamine Azo  
Orange RR

shaded with

Diamine Orange F

} diazotised and  
developed  
with Beta  
Naphtol as  
per direction  
on page 267

Primuline, diazotised and developed  
with Resorcine †.

† Resorcine is treated in exactly  
the same manner as Beta Naphtol,  
see page 267.

\* Diamine Fast Yellow 3G is  
dyed in soft water with the addition  
of 10% phosphate of soda and a  
little soap.

d) Of Best Fastness to Light and  
Milling

For the wool, the following are  
used:

1. According to the After-Chroming

Process:

Anthracene Yellow BN, C, BG,  
R, RN, GG

Anthracene Orange G

Anthracene Chrome Red G, A,  
dyed as per directions on  
pages 12/13.

2. According to the Chromate Process:

Anthracene Yellow BN, C,  
BG, R, RN, GG

Anthracene Orange G

Anthracene Chrome Red G.

Dyed as per directions on page 14.

Subsequent Covering of the Cotton:

After rinsing well, the previously  
dyed material is dyed with

Immedial Yellow GG, D

Immedial Orange C

Immedial Cutch O,

as per directions on page 274.

# DYESTUFFS FOR PINK AND RED ON UNION GOODS (PIECE-GOODS, HANKS AND LOOSE MATERIAL).

## a) Simplest Method of Production

Pink:

One-Bath Dyeings:

Diamine Rose BD, GD, BG, FFB  
Direct Rose T  
Diamine Brilliant Rubine S  
Diamine Brilliant Bordeaux R  
Diamine Orange F  
shaded with  
Erythrosine B, D, extra N  
Rosazeine B  
Irisamine G.

For weakly acid dyeing, the same dyestuffs come into consideration.

Red:

One-Bath Dyeings:

Diamine Red 4B, 5B, 6B, 10B, 101J  
Diamine Purpurine B, 3B, 6B, V  
Diamine Scarlet B, 3B  
Diamine Fast Scarlet GG, GFF, 4BFF, 5BFF, 7BFF, 8BF, 10BF  
Diamine Fast Red F, 8BL  
Diamine Brilliant Rubine S  
Union Fast Red R.

For dyeing weakly acid

(page 254):

Diamine Purpurine B, 3B, 6B, V  
Diamine Fast Scarlet, all brands  
Diamine Fast Red 8BL  
Diamine Brilliant Rubine S

According to the Two-Bath Method

first dyed with the dyestuffs mentioned on page 114.

Cotton-dyed subsequently with

Diamine Red 4B  
Diamine Purpurine 6B.

## b) Better Fastness to Light

Pink:

One-Bath Dyeings:

Of better Fastness to Light:  
Diamine Rose BD, GD, BG, FFB  
Diamine Brilliant Bordeaux R.

Of better Fastness to Milling:  
Direct Rose T  
Rosazeine B.

Red:

One-Bath Dyeings:

In better Fastness to Light:  
Diamine Fast Red F, 8BL  
Union Fast Red R.

Of better Fastness to Milling:  
Diamine Fast Red F, after-treated with chrome salts

Primuline shaded with Wool Red B *Diamine Azo Scarlet A, B	}	diazotised and developed with Beta Naphthol
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According to the Two-Bath Process, dyeings of good fastness to milling are produced with

Diamine Azo Scarlet 4B, 8B, 8B extra, 4BL extra, 6BL extra

first dyed in a bath of 50–60° C. (120–140° F.), diazotised, developed with Beta Naphthol and topped with

Milling Red G  
Wool Red BG  
Diamine Scarlet B, 3B

in an acid bath.

\* Diamine Azo Scarlet A and B, with a view to obtaining solid shades on the wool and the cotton, are dyed at 70–80° C. (160–175° F.).

# DYESTUFFS FOR CLARET AND VIOLET ON UNION GOODS (PIECE-GOODS, HANKS AND LOOSE MATERIAL).

## a) Simplest Method of Production

Claret.

### One-Bath Dyeings:

Diamine Bordeaux B, S,  
VRO, BR  
Oxy Diamine Violet G, R  
Union Fast Bordeaux FR  
Diamine Violet Red  
Diamine Brilliant Bordeaux R  
Diamine Fast Bordeaux 6BS.

### For dyeing weakly acid:

Diamine Bordeaux B  
Oxy Diamine Violet G, R  
Diamine Fast Bordeaux 6BS  
Diamine Brilliant Bordeaux R  
Union Fast Bordeaux FR.

Violet.

### One-Bath Dyeings:

Diamine Violet N, BB, RB,  
2204J, 2205J  
Oxy Diamine Violet B, R, BF  
Diamine Heliotrope B, O, G  
Union Fast Heliotrope B  
shaded with wool dyestuffs and  
topped if necessary to increase the  
brightness, with

Methyl Violet or Crystal Violet

For dyeing weakly acid any of  
the above colours may be used.

### Two-Bath Dyeings:

Very bright Violet shades are  
obtained by first dyeing the wool  
in an acid bath and covering the  
cotton subsequently with Basic  
Colours on a tannin and antimony  
mordant.

## b) Of Better Fastness

Claret.

### One-Bath Dyeings:

Of better Fastness to Light:

Diamine Bordeaux B, BR  
Diamine Brilliant Bordeaux R  
Diamine Fast Bordeaux 6BS  
shaded with  
Wool Red B.

Of good Fastness to Milling:

Diamine Nitrazol Bordeaux GB  
coupled with Nitrazol C.

Diamine Azo Bordeaux B  
Primuline

shaded with

Diamine Azo Blue RR  
Formyl Violet S4B

diazotised and  
developed with  
Beta Naphтол.

Of best Fastness to Milling  
and Light:

### Two-Bath Dyeings:

Anthracene Chrome Red A, G  
Anthracene Chrome Violet B  
subsequently cotton-dyed with  
Immedial Bordeaux G conc.,  
GF conc.  
Immedial Maroon B conc.  
as per directions on page 274.

Violet.

Of better Fastness to Light:

### One-Bath Dyeings:

Diamine Fast Violet BBN  
Union Fast Heliotrope B.

Of good Fastness to Milling:

### Two-Bath Dyeings:

Anthracene Chrome Violet B  
Formyl Violet S4B  
cotton-dyed with  
Immedial Violet CB, CR.



# DYESTUFFS FOR DARK BLUE ON UNION GOODS

## Light and Medium Blue

### a) Simplest Method of Production

#### One-Bath Dyeings:

Union Blue 806J, OHDF,  
2570J, 2472J

Union Navy Blue 780J

or combinations of

Oxy Diamine Blue G, 3G

Diamineral Blue R, CV, CVB

Diamine Black BH, BHN, BHR

Union Dark Blue KN

Oxy Diamine Black A, SA, KW

Para Diamine Black

B, BB, FFB

with neutral-dyeing wool dyestuffs.

#### For weakly acid dyeing

(page 254):

Diamine Fast Blue FFB

Diamineral Blue CVB

Diamine Blue NC

Diamine Bengal Blue G, R

Diamine Black BH, BHN, BHF

Oxy Diaminogene OB

shaded with the various neutral-dyeing blue and violet wool colours.

#### Two-Bath Dyeings:

Two-bath dyeing comes more particularly into consideration for dark shoddy goods (see pages 306-308).

### b) Of better Fastness to Light

#### One-Bath Dyeings:

Diamine Fast Blue FFB

Diamine Dark Blue B

Union Black S

Diamine Jet Black SS, OO

Diamine Black BH, BHF

in combination with

Lanacyl Violet B, BF

Lanacyl Navy Blue B

Alphanol Blue GN, 5RN,

BR extra

shaded with

Formyl Violet

Formyl Blue B

Brilliant Milling Blue B.

For shading the cotton subsequently towards red,

Diamine Heliotrope B

Diamine Bordeaux B

are used.

#### Two-Bath Dyeings (pages 266/67):

Piece-goods possessing good fastness to perspiration and wear are to advantage first dyed in a hot bath with

Diamine Black BH, BHF,

BHN or BHR

then diazotised and developed, and finally cross-dyed with Acid-Colours.

For the inverse method of working, i. e. dyeing the wool first, then the cotton and subsequently diazotising and developing, the following Acid Dyestuffs come into consideration:

Azo Wool Blue SE, SER, 6B

Azo Navy Blue B, 3B

Acid Navy Blue A, KP

Azo Fast Blue B, BD, BR conc.



(PIECE-GOODS, HANKS AND LOOSE MATERIAL).  
see next page.

c) Of good Fastness to Milling

One-Bath Dyeings:

Diamineral Blue R, BF, CV,  
CVB

Diamine Dark Blue B

Diamine Jet Black SS, CR,  
RB, OO

Union Black S

aftertreated with

3% bichrome

1—2% acetic acid

in combination with

Formyl Violet, all brands

Alkaline Violet C, CA

Brilliant Milling Blue B

Formyl Blue B

Brilliant Milling Green B.

For very deep Blues:

Para Diamine Black B, FFB

Oxy Diamine Black A, SA,  
JW, JWF

in combination with

Formyl Violet, all brands

Brilliant Milling Green B

aftertreated with

3% formaldehyde

or

3% formaldehyde

1% bichrome.

d) Of Best Fastness to Milling

Wool-dyed with

a) At the same time of good fastness to light:

Anthracene Acid Blue  
EB, ER

Anthracene Chrome  
Blue F, BB, G

Anthracene Chrome  
Violet B

} after-chromed,  
see pages 12 and 13

b) for cheaper and brighter dyeings:

Anthracene Acid Black  
SR, SBB

in combination with

Formyl Violet, all brands

Formyl Blue B

Brilliant Milling Blue B

Brilliant Milling Green B

Tetra Cyanole A.

For the cotton, the following dyestuffs come into consideration:

Immedial Direct Bue B, R,  
OD, JB,

JB extra conc.

BB extra conc.

4B extra conc.

Immedial Black NN conc.

Immedial Carbon B.

Directions page 274.

# DYESTUFFS FOR LIGHT AND MEDIUM BLUES ON UNION GOODS (Piece-Goods, Hanks and Loose Material).

## a) Simplest Method of Production

### One-Bath Dyeings:

Union Blue BJ, KBJ, RJ,  
2168J, BB  
Union Sky Blue KF  
Diamine Sky Blue 4470J  
or combinations of  
Diamine Sky Blue  
Diamine Pure Blue A  
Oxy Diamine Blue 5G, 3G, G,  
B, R, PG, PB, PR  
Diamine Blue BB, 3B, RW  
Diamine Brilliant Blue G  
Diamineral Blue CV, CVB, B,  
3B, BF, R  
and neutral-dyeing wool colours.

For weakly acid dyeing, any of  
the above-mentioned dyestuffs may  
be used.

In order to increase the bright-  
ness of the shades, they may be  
topped in a fresh bath with

Methylene Blue BB  
New Methylene Blue GG, N  
Victoria Blue B.

### Two-Bath Dyeings:

Particularly bright shades are  
obtained by dyeing the wool in an  
acid bath (see the tables for wool-  
len piece-dyeing on page 116) and by  
subsequently covering the cotton with  
Diamine Colours or Basic Colours  
(see pages 268 and 275).

## b) Of better Fastness

### Of better fastness to light:

#### One-Bath Dyeings:

Union Fast Blue F, FR  
Union Blue BB  
Diamine Fast Blue FFB,  
FFG, G, BN  
Diamine Sky Blue FF, FFS  
Oxy Diamine Blue 5G, 3G  
Diamine Brilliant Blue G  
Diamine Blue RW  
Diamineral Blue CV,  
CVB, BF, R  
in combination with  
Alizarine Cyanole EF, B  
Lanacyl Blue BB, R, BN, RN  
Tetra Cyanole A  
Brilliant Milling Green B  
Brilliant Milling Blue B  
Formyl Blue B.

aftertreated with  
copper sulphate

#### Two-Bath Dyeings:

Wool-dyed with  
Alizarine Cyanole or  
Lanacyl Blue  
and then cotton-dyed with  
Diamine Fast Blue  
FFB, G, BN.

### Of better fastness to milling:

#### One-Bath Dyeings:

Diamine Sky Blue FF, FFN, FFS  
Diamine Brilliant Blue G  
Diamine Blue RW  
Diamineral Blue R, B,  
BF, 3B, CV, CVB  
shaded with wool colours fast to  
milling (see page 263).

aftertreated  
with  
sulphate of  
copper  
aftertreated  
with  
bichrome

**DYESTUFFS FOR GREEN ON UNION GOODS (PIECES, HANKS AND LOOSE MATERIAL). For Dark Green see following page.**

a) Simplest Method of Production	b) Of better Fastness
<p><u>One-Bath Dyeings:</u></p> <p>Union Green 3446J, 3640J, 4481J  Diamine Green 2209J, 2210J, 4419J  Diamine Green G, B, FG, CL  Diamine Nitrazol Green S</p> <p>or combinations of</p> <p>Diamine Sky Blue, all brands  Diamine Pure Blue A  Oxy Diamine Blue 5G  Diamine Steel Blue L  Oxy Diamine Yellow GG, TZ  Thioflavine S</p> <p>shaded with</p> <p>Brilliant Milling Green B  Tetra Cyanole A  Naphtaline Yellow Crystals  Indian Yellow G, FF</p> <p>Dye as per directions on page 252; if an increase in brightness of shades is required, top with</p> <p>Brilliant Green Crystals extra  Solid Green Crystals O  Thioflavine T, TCN  Paraphosphine GG</p> <p>with the addition of 2-3% acetic acid in a cold bath as per directions given on page 275.</p> <p>For dyeing weakly acid in one bath it is best to use combinations of the above-mentioned Diamine and Wool Colours.</p> <p>Method of dyeing as per directions on page 264.</p>	<p><u>One-Bath Dyeings:</u></p> <p>Of better Fastness to Light:</p> <p>Union Fast Green GG  Diamine Green 2209J, 2210J  Diamine Green G, B, FG, CL  Diamine Nitrazol Green S</p> <p>or combinations of</p> <p>Diamine Sky Blue  FF, FFN, FFS  Oxy Diamine Blue 3G, 5G  Diamine Blue RW  Diamine Fast Yellow  FF, B, A, AGG  Diamine Fast Blue  FFB, FFG, G  Diamine Fast Yellow FF, B,  Diamine Yellow CP [A, AGG</p> <p>shaded with</p> <p>Alizarine Brilliant Green G  Tetra Cyanole A  Brilliant Milling Green B</p> <p>died in a neutral or weakly acid bath.</p> <p>Of better fastness to milling:</p> <p>The above-mentioned dyestuffs aftertreated with sulphate of copper; further:</p> <p>Diamine Green G, aftertreated with chromic salts  *Diamine Nitrazol Green S, BB, GF coupled with Nitrazol G shaded with wool colours fast to milling.</p> <p>* Diamine Nitrazol Green BB and GF are best used for cotton-dyeing from the grey.</p>

aftertreated with sulphate of copper

## a) Simplest Method of Production

### One-Bath Dyeings:

Diamine Dark Green N  
 Diamine Green B, G, CL, BO,  
 FG, 2209J, 2210J  
 Diamine Black HW, BH  
 Oxy Diamine Black JE  
 Diamine Steel Blue L, 2206J  
 Diamine Fast Yellow A, B,  
 FF, M, AGG, FR  
 Diamine Yellow CP  
 Diamine Orange B  
 Diamine Catechine G, 3G  
 Oxy Diamine Brown G, 3GN  
 Diamine Brown 3G

shaded with wool colours.

### For weakly acid dyeing:

Diamineral Blue B, 3B  
 Diamine Black HW, BH  
 Diamine Fast Orange EG, ER  
 Union Fast Orange G, R  
 Diamine Fast Yellow M, FR,  
 FF, A, AGG

shaded with the wool dyestuffs  
 enumerated sub (b).

### Two-Bath Dyeings:

Shoddy goods are frequently dyed  
 according to the two-bath process  
 with wool colours, and cotton-dyed  
 with Diamine Colours. See pages  
 306—308.

## b) Of Better Fastness to Light:

### One-Bath Dyeings:

Union Fast Green BB, GG  
 Diamine Fast Black F, X  
 Diamine Fast Yellow A, AGG,  
 FF, FR, M  
 Diamine Yellow CP  
 Union Fast Orange G, R  
 Union Fast Brown R  
 shaded with  
 Alizarine Brilliant Green G  
 Naphtol Dark Green G  
 Brilliant Milling Green B  
 Indian Yellow G, R, FF  
 Orange extra, II, IV, ENZ.

### Two-Bath Dyeings:

These are produced by means of  
 combinations of the Acid Colours  
 enumerated on page 118, the cotton-  
 dyeing being done with

Diamine Black RMW, BH,  
 BHF  
 Diamine Fast Yellow  
 B, A, AGG  
 Diamine Yellow CP  
 Diamine Orange G, D  
 as per directions on page 268.

# (PIECE-GOODS, HANKS AND LOOSE MATERIAL).

## c) Of Good Fastness to Milling

### One-Bath Dyeings:

Diamine Green G	aftertreated with bichrome, chromium fluo- ride or chrome alum and acetic acid.
Diamine Yellow N	
Diamine Bronze G	
Diamine Fast Yellow A, FF, B	
Oxy Diamine Yellow CR	
*Diamine Nitrazol Green S, GF, BB	coupled with Nitrazol C. R
Diamine Nitrazol Orange	
Diamine Fast Yellow A	
Union Black S	aftertreated with bichrome and acetic acid.
Diamine Jet Black SS	
Diamineral Blue R, BF, B, 3B	
Diamine Deep Blue B, R	
Oxy Diamine Brown G, RN	
Diamine Catechine G, 3G	
Diamine Fast Yellow B, A, FF	
Oxy Diamine Yellow CR	

For shading the wool, the follow-  
ing are very well suited:

Brilliant Milling Green B  
Tetra Cyanole A  
Alizarine Brilliant Green G  
Formyl Blue B.

Dye with the addition of Glau-  
ber's salt crystals as per directions  
on page 252. and aftertreat as per  
directions on page 264.

\* Of the Diamine Nitrazol Green  
brands, "S" dyes wool and cotton  
alike, whilst GF and BB should  
be shaded with wool colours.

## d) Of Best Fastness to Milling and Light

### 1. According to the After-chroming

#### Process:

Wool-dyed with  
Anthracene Chrome Blue G  
Anthracene Chromate Green  
KFF extra  
Alizarine Brilliant Green  
G, SE  
Anthracene Yellow BN, RN, BG  
Anthracene Acid Brown G.  
Directions on pages 12 and 13.

### 2. According to the Chromate

#### Process:

Wool-dyed with  
Anthracene Chromate Green  
B, KFF extra  
Alizarine Brilliant Green  
G, SE  
Anthracene Yellow C, BN,  
RN, BG  
Anthracene Chromate Brown  
3G, WG, WS  
(directions on page 14)

shaded with  
Brilliant Milling Green B  
Tetra Cyanole A.

For Covering the Cotton, the  
following come into consideration:

Immedial Dark Green B  
Immedial Deep Green G  
Immedial Olive B, GG, 3G  
Immedial Yellow Olive G, 5G  
Immedial Yellow D  
Immedial Orange C  
Immedial Yellow Brown EN  
Immedial Cutch G, BG, BGG  
Immedial Black NNG conc.

(see directions on page 274).

# DYESTUFFS FOR BLACK ON UNION GOODS

## a) Simplest Method of Production

### One-Bath Dyeings:

Union Black S, P, BG, BB,  
3B, OJGJ, 1993J, KD, AB  
Union Jet Black B, GB  
Oxy Diamine Black A, D, SA,  
FFC, JE, JEI, JW, JWF,  
US, UI

Para Diamine Black B, BB,  
FFB  
in combination with the wool  
colours mentioned sub (b).

Also the following:

Duatol Black BT, 3B, 2902J,  
KS  
Duatol Discharge Black KP.

### For weakly acid dyeing:

Oxy Diamine Black JE, JEI,  
JW, JWF, SOOO

Para Diamine Black FFB

Oxy Diaminogene OB  
in combination with the wool  
colours mentioned sub (b).

### Two-Bath Dyeings:

Shoddy goods are frequently dyed  
according to the two-bath system by  
cotton-dyeing first in the milling  
machine or in the open vessel with

Diamine Milling Black B conc.,  
FG extra, FFB extra conc.

Para Diamine Black  
B extra conc.,  
BB extra conc.,  
FFB extra conc.

Oxy Diamine Black UI extra  
conc., US extra conc.

and cross-dyeing the wool with

Naphtylamine Black or  
Naphtylamine Blue Black.

## b) Of Better Fastness to Light

### One-Bath Dyeings:

Union Fast Black J, SB

or

Diamine Fast Black F,  
XN extra conc.,  
C and CB high conc.

in combination with

Alphanol Black BG, R, 3BN  
Neutral Wool Black B, G, 4B  
Naphtylamine Black 4B, 6B,  
X2B, X3B, D, 4BN, BB,  
BBN, BBV, 3BV, R, RNB,  
NBB, HWN

shaded with

Indian Yellow G, R, FF  
Orange extra, II, IV, ENZ, R  
Formyl Violet, all brands  
Formyl Blue B.

### Two-Bath Dyeings:

Cotton-dyed with

Diamine Black BH, BHF,  
BIIN or BIIR,  
and diazotised and developed as per  
directions on page 267.

The wool is then cross-dyed at  
the boil in the usual manner with  
Naphtylamine Black 4B, 6B,  
S, ESN etc.

Naphtylamine Blue Black B,  
5B

Alphanol Black K4BN, KV  
Anthracene Acid Black  
ST, SRT.

(PIECE-GOODS, HANKS AND LOOSE MATERIAL).

### c) Of Good Fastness to Milling

### One-Bath Dyeings:

Union Black S	} aftertreated with bichrome and acetic acid
Oxy Diamine Black	
UI, US	

Oxy Diamine Black  
JE, JEI, JB, JW, JWF,  
UI, US, SA, FFC

Para Diamine Black  
B, BB, FFB

Diamine Fast Black X, F,  
XN extra conc.  
CB high conc.

Diamine Aldehyde Black  
B conc. and BB conc. ffterre

Oxy Diamine Black JW  
coupled with  
3% Nitrazol C

in the rinsing bath, as per directions  
page 265.

Jet Black on Union yarn is dyed with

Diamine Black BH, BHF,  
BHN, BHR

Diaminogene B

Oxy Diaminogene OB, OT

in combination with

Alphanol Black 3BN, BG,  
K4BN, KV

subsequently diazotising and developing with Phenylene Diamine.

d) Of Best Fastness to Milling  
and Light

### Two-Bath Dyeings:

Dye the wool with

Anthracene Acid Black SAS,  
SASG, SASB, SASN, SR,  
SBB

Anthracene Acid Black  
DSN, DSF, DNG

Anthracene Chrome Black  
PBB, PPC extra, F, 5B,  
1465Z, PF extra

as per directions on pages 12 and 13, rinse, and cover the cotton in a fresh bath charged with

7—10% Immedial Black

7—10% sodium sulphide cryst.

14—20% glucose

or

5—7% Immedial Carbon

10—14% sodium sulphide cryst.

20—28% glucose

as well as with

3 oz soda

3 lbs Glauber's salt	} per 10 gallons liquor
crystals	

see directions on page 274.



## DYEING OF UNIONS CONTAINING SILK.

The dyeing of fabrics composed of wool, cotton and silk is rather more complicated than that of goods consisting of wool and cotton, and requires a thorough knowledge of the dyestuffs to be used as regards their behaviour towards the three kinds of fibres.

The goods are dyed *solid shades* as well as in *two* or *three* different colours; in the two latter cases either

1. Wool and silk are dyed the same, and cotton in a contrasting shade, or
2. the cotton is first dyed, the wool and silk being dyed uniformly or different shades, subsequently, or
3. the wool is dyed first, the cotton and silk being subsequently covered uniformly or in different shades.

### a) Solid Shades.

These dyeings are produced according to the one-bath method as customary for unions goods, with Diamine Colours in combination with Wool Colours. Best suited for the purpose are those Diamine Colours which cover wool, cotton and silk when working by a suitable method to the same degree, or approximately the same degree.

In most cases, the shading should be done, same as in the case of unions, with neutral-dyeing wool colours, which at a low temperature go rather more on to the silk, and at a higher temperature more on to the wool.

*Diamine Colours which dye wool, cotton and silk approximately alike:*

Thioflavine S	Diamineral Brown G
Oxy Diamine Yellow TZ	Union Brown 1926J, 2089J,
Diamine Fast Yellow 3G,	3493J, 4221J, 4354J, TD
M, FR	Union Dark Brown A
Union Fast Yellow G	Union Fast Brown R
Diamine Orange B, F	Diamine Green B, G, CL,
Diamine Catechine G, 3G	BO, FG, 2209J, 2210J,
Diamine Brown R, M,	4419J
BWA, GWA	Union Green
Diamine Brown No. 40,	4481J, 3640J, 3446J,
42, 44	4207J
Oxy Diamine Brown G,	Diamine Dark Green N
3GN	



Diamine Rose BD, GD,	Diamine Blue RW
FFB	Diamine Bengal Blue G
Diamine Scarlet B, 3B, HS	Diamine Steel Blue L,
Diamine Red 4B, 5B	2206J
Cotton Red A	Oxy Diamine Blue 5G, 3G,
Diamine Fast Red F	G
Union Fast Red R	Union Blue 2168J, BJ, KBJ
Diamine Bordeaux B, S	761J, 3888J, 4036J, 4083J
Union Fast Bordeaux FR	Union Fast Dark Blue B, R
Diamine Brilliant Bordeaux	Diamine Black HW, KBB
R	Union Black S, KD,
Diamine Purpurine B, 6B	3955J, 4409J, 4506J
Diamine Azo Scarlet A, B	Oxy Diamine Black SOOO.
Diamine Violet N, 2205J	N, JW, JWF, JB, FFC
Oxy Diamine Violet B, G	Universal Black KB
Union Fast Heliotrope B	Union Fast Black SB;

further, the Duatol Colours mentioned on page 261.

*Wool Colours for the Shading of Wool and Silk:*

Milling Yellow O, OO	Formyl Violet, all brands
Indian Yellow G, FF	Alkaline Violet CA, C
Fast Acid Yellow 3G	*Lanacyl Blue BB, R, BN,
Orange extra, R, EN	RN
*Brilliant Cochineal 4R	*Lanacyl Navy Blue B, BB
Roccelline	*Naphtol Blue G, R
Croceïne AZ	Wool Blue OD, OC, OJF
Rosazeïne B	Alizarine Cyanole B
Irisamine G	Alizarine Cyanole Violet R
*Azo Red A	Alizarine Brilliant Green G
Wool Red B, BG	*Naphtol Dark Green G
Milling Red G	*Naphtol Blue Black
Brilliant Milling Green B	Alphanol Blue BR extra,
Brilliant Milling Blue B	GN, 5RN
Tetra Cyanole A	Alphanol Black BG, R, 3BN
Formyl Blue B	Neutral Wool Black B, G.

The dyestuffs marked with an asterisk (\*) go on to the wool only, leaving the silk almost entirely unstained.

*Dyeing Directions for Solid Shades.*

Dye with

$\frac{1}{2}$ —2 lbs Glauber's salt crystals per 10 gallons liquor

depending on the depth of the shade to be dyed, and the requisite Diamine Colours, if necessary in combination with the suitable Wool Colours; enter the goods at 50—60° C. (120—140° F.), raise gradually to the boil, boil for 20 to 30 minutes, and allow to run for  $\frac{1}{2}$  hour in the cooling bath.

Should the *wool* be still too light, raise again to boiling temperature, and if necessary shade with Wool Colours; continuous boiling is to be avoided, as hereby the dyestuff goes off the silk and on to the wool, which then easily turns too dark. Should the *cotton* and the *silk* be too light, work below boiling temperature (at 50—60° C. = 120—140° F.) and add the Diamine and Wool Colours which the shade is short of. In case only the *silk* is to be slightly shaded subsequently, this is best done in a fresh cold to lukewarm bath with the addition of about 5% acetic acid and such Acid Colours which go readily on to the silk and leave the wool as much as possible undyed.

For suitable dyestuffs for shading the silk see the subsequent section. "Dyeing of Wool and Silk Fabrics".

Basic Colours dyed in a cold bath go particularly readily on to the silk; on the other hand they affect the wool more severely and go also on to the cotton.

Suitable dyestuff combinations for one-bath dyeing of solid shades are the following:

*For Pink:*

0.05—0.25% Diamine Rose BD, FFB  
 0.01—0.1 % Rosazeïne B.

*For Red:*

2—3% Diamine Scarlet B or  
 3—4% Diamine Red 4B  
                     in combination with  
                     Rosazeïne B.

*For Claret:*

2% Diamine Bordeaux S  
 2% Diamine Bordeaux B  
 1% Diamine Fast Scarlet 4BFF.

*For Prune:*

- 4 % Diamine Violet 2205J
- 1 % Diamine Brown M

*For Coffee Brown:*

- 4 % Diamine Brown M
- 0.3 % Formyl Blue B.

*For Yellow Brown:*

- 3 % Oxy Diamine Brown 3GN
- 0.25 % Diamine Green B
- or
- 3 % Union Brown 1926J.

*For Light Green:*

- 1.25 % Diamine Green B
- 1 % Diamine Sky Blue FF
- 1.25 % Oxy Diamine Yellow TZ
- 1.1 % Brilliant Milling Green B
- or
- 3 % Diamine Green 4419J, 2210J.

*For Dark Green:*

- 4 % Diamine Dark Green N
- 0.4 % Brilliant Milling Green B
- or
- 4 % Union Green 4207J.

*For Navy Blue:*

- 2 % Diamineral Blue R or CVB
- 1 % Oxy Diamine Black JW or JWF
- 0.5 % Formyl Blue B
- 1.25 % Formyl Violet 10B.

*For Black:*

- 8 % Oxy Diamine Black JB, JW or JWF
- 0.5 % Formyl Violet 10B

or

the brands of Black mentioned on page 331.

Black is used moreover and quite particularly for the production of very fast dyeings according to the diazotising process, for which particularly the following brands come into consideration:

Diamine Black KBB by itself,

or

Diaminogene B

Diamine Black DB, DN

Oxy Diaminogene OB, OT

in combination with

Alphanol Black BG, 3BN

Naphtylamine Black 6B, 4B

Neutral Wool Black 4B, B, G

Naphtol Blue Black

Formyl Violet 10B

Brilliant Milling Blue B

Formyl Blue B.

Dye in a neutral or slightly acidulated bath (with the addition of Glauber's salt or Glauber's salt and sal ammoniac (see page 254), rinse, diazotise and develop with Phenylene Diamine or Phenylene Diamine and Beta Naphtol as per directions on page 267.

### b) Multi-Coloured Dyeings.

1. *Wool and silk dyed the same shade, the cotton dyed another shade;* this is done with the Acid Colours mentioned for the dyeing of wool and silk fabrics (pages 353—355). The cotton is subsequently covered with Diamine Colours in a fresh, cold bath with Diamine Colours as stated on page 268, but without the addition of either soda or ammonia.

Following the covering of the cotton, a shading of the silk may, if required, take place in a lukewarm, acidified bath; for the dyestuffs best suited for this purpose see page 363.

3. *For dyeing the cotton first, so that the wool and the silk may be dyed subsequently,* diazotised and developed dyeings come first of all into consideration, viz:

*For Black:*

Diamine Black BH, BHN, BHR

Diamine Azo Black B

Oxy Diaminogene OB, OT

Diaminogene B

} diazotised and developed with Beta Naphtol.

*For Navy Blue and Blue:*

Diamine Black BH, BHF, BHR  
Diaminogene Blue NB, NA, 2RN, 3RN  
Diamine Azo Blue R, RR  
Diamineral Blue CVB

*For Red and Claret:*

Diamine Azo Scarlet 4B, 8B, 4BL extra  
6BL extra, 8B extra  
Diamine Azo Bordeaux B  
saddened with  
Diamine Azo Blue RR  
Diaminogene Blue 3RN, 6RN  
Diamine Black BH

diazotised  
and  
developed  
with Beta  
Naphтол.

Dye in a moderately hot bath, at about 50° C. (120° F.), with the addition of 1—2 lbs Glauber's salt crystals per 10 gallons liquor, at the same time adding 3—4¼ oz soap per 10 gallons in order to prevent the dyestuff as much as possible from going on to the wool and the silk.

After lightly rinsing the goods, diazotise and develop (see page 267), and top the wool and silk either to the same shade or to two different shades, according to requirement. In the latter case, the wool if first dyed at the boil to approximately the shade desired, the silk being covered subsequently in a cold to lukewarm bath.

For suitable dyestuffs for the various methods see the section on "Dyeing of Materials composed of Wool and Silk" (pp. 354—364).

3. *Dyeing the Wool first and the Cotton and Silk subsequently.*

For dyeing the wool, those dyestuffs come into consideration which leave the cotton and the silk as much as possible undyed (see pages 358—360), in order to obtain the shot effects as clear as possible when subsequently dyeing them in different shades. In case of need, the silk may be cleared with hydrosulphite solution or in some other suitable manner (see pages 361 and 362).

Then follows the *covering of the cotton with Diamine Colours* in a cold to lukewarm bath as per directions on page 268, whereupon the *silk is dyed with suitable Acid Colours* in a slightly acidulated cold to lukewarm bath (see page 363).

### Unions with Coloured Silk Shot Effects.

The production of piece-dyed union goods containing coloured silk effects renders it necessary to dye the silk before weaving it and to submit it to a special treatment in order to prevent it from absorbing any more dyestuff in the subsequent dyeing of the piece.

#### Dyeing the Silk Effects.

For the dyeing of the silk, such dyestuffs should be used as resist perfectly the process of preparation as well as the subsequent boiling of the piece-goods; as such, chiefly diazotised and developed or coupled Diamine Colours (see the chapter on Silk Dyeing, pages 223 and 224), and for bright shades, Basic Colours, are applied.

#### Resisting the Silk.

The dyed silk is entered into a boiling hot bath containing 20—30% tannin, calculated on its weight, and left in the bath for 2 to 3 hours, best overnight. Hereafter wring off or whizz, and treat for  $\frac{1}{2}$  hour in a bath of 70—80° C. (160—175° F.) with the addition of 12—15% antimony salts, then rinse, and pass through a bath of 40—50° C. (105—120° F.) containing 3—4% tin crystals (dissolved with an addition of one-half its weight of hydrochloric acid) for 20 to 30 minutes. Then rinse thoroughly, and dry.

The material thus treated is worked in the usual manner,\* the goods being then dyed as indicated below.

#### Dyeing of Union Goods Containing Previously Dyed Silk Shot Effects.

The dyeing of union goods may be carried out either according to the one-bath method with Diamine or Union Colours or in two baths; the latter process is to be given the preference particularly for deep shades, as the effects are then kept clearer than by following the one-bath method.

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\* When milling the goods, it is advisable to avoid strongly alkaline milling lyes, and moreover to take care that the right side of the goods, showing silk effects, does not rub against the wood or metal parts, as such friction is apt to deaden or blue the effects. The goods, moreover, should not be left lying in the milling lye for any length of time.

1. One-Bath Method.

For dyeing according to the one-bath method, the following dyestuffs are best suited:

*For Yellow and Orange:*

Oxy Diamine Yellow TZ  
 Thioflavine S  
 Diamine Fast Yellow M, B, FF  
 Diamine Fast Orange EG, ER  
 Union Fast Orange R, G  
 Duatol Yellow 2881J.

*For Brown:*

Oxy Diamine Brown G, RN  
 Diamine Catechine 3G  
 Diamine Fast Brown R, G, GB  
 Union Fast Brown R, G, RD  
 Diamine Nitrazol Brown G, B  
 Diamine Brown M, S  
 Alphanol Brown B  
 Duatol Brown R, 2817J

*For Red:*

Diamine Rose GD, BD, FFB  
 Diamine Fast Scarlet GFF, 4BFF, 5BFF, 7BFF,  
 8BF, 10BF  
 Diamine Brilliant Rubine S  
 Diamine Brilliant Bordeaux R  
 Diamine Red 10B  
 Diamine Violet Red  
 Diamine Bordeaux VRO, B  
 Union Fast Bordeaux FR  
 Duatol Scarlet G  
 Duatol Bordeaux B  
 Duatol Red 2778J

for shading the wool:

Milling Red G  
 Azo Red A.

*For Violet:*

Diamine Violet N  
 Diamine Fast Violet BBN  
 Oxy Diamine Violet BF  
 Union Fast Heliotrope B  
     for shading the wool:  
 Lanacyl Violet B. BF.

*For Green:*

Diamine Green B, G, FG  
 Diamine Dark Green N  
 Diamine Black HW  
 Diamine Nitrazol Green S  
 Union Fast Green GG, BB  
     for shading the wool:  
 Naphtol Dark Green G.

*For Blue:*

Diamine Fast Blue FFB, FFG  
 Diamine Steel Blue L  
 Union Blue BB  
 Duatol Blue BD  
 Diamine Azo Blue 6B  
 Diamineral Blue R, B, 3B, CVB, BF  
 Diamine Black BH, BHF  
 Union Fast Blue F, FR, F3R  
 Diamine Bengal Blue G  
 Diamine Blue RW  
     for shading the wool:  
 Lanacyl Blue BB, R, BN, RN  
 Naphtol Blue Black  
 Alphanol Blue GN, 5RN, BR extra  
 Naphtol Blue G.

*For Grey:*

Diaminogene B, extra  
 Diamine Dark Blue B  
 Union Black  
 Union Fast Grey G, BR  
 Diamine Fast Grey BN  
 Duatol Grey 2819J  
 Direct Grey 2207J  
     for shading the wool:  
 Lanacyl Blue BB, R, BN, RN  
 Naphtol Blue Black.



*For Black:*

Union Black  
 Diamine Fast Grey BN  
 Union Black OJGJ  
 Para Diamine Black FFB  
 Oxy Diamine Black JB, JW  
 Oxy Diaminogene ED  
 Duatol Black 3B  
     for shading the wool:  
 Naphtol Blue Black.

The dyeing is carried out in the customary manner, with the addition of Glauber's salt, in a boiling hot bath; continuous boiling should be avoided as much as possible. After the dyeing is completed, the goods are well rinsed and soured off weakly.

## II. Two-Bath Method.

Union goods containing silk effect threads which have been previously dyed may be dyed by the two-bath method by first dyeing the wool in an acid bath and then covering the cotton in a cold bath, or, the cotton may be first dyed in a moderately hot bath (at 50—60° C. or 120—140° F.) either with direct dyeing or with developing dyestuffs, the goods being subsequently wool-dyed in the well-known manner. The latter process is preferable particularly for deep, full shades.

### *Dyeing the Wool first and Cotton-Dyeing subsequently.*

For *dyeing the wool*, dyestuffs are used which have little inclination to go on to the silk; these are given in the chapter on "The Dyeing of Wool and Silk mixed Goods", page 358.

For the subsequent dyeing of the cotton the Diamine Colours mentioned on page 269 are used in accordance with the instructions on page 268.

### *Dyeing the Cotton first and the Wool subsequently.*

The *cotton is dyed* in a bath of 50—60° C. (120—140° F.) with the direct dyeing, or, diazotised and developed or coupled dyestuffs indicated on pages 270—273. The goods are then rinsed, and *wool-dyed with the Acid Colours* indicated on page 108 and following pages.

# UNIONS CONTAINING ARTIFICIAL SILK.

In the same way as indicated for the dyeing of all-wool goods containing artificial silk effects (page 149), the material has to be carefully treated in all the preparing and dyeing operations with a view to maintaining the brilliancy and the tensile strength of the silk. Of the various kinds of artificial silk, Viscose Silk has been found to withstand best.

Unions containing Artificial Silk are either dyed solid or in two different shades.

## a) Solid Shades.

The dyeing is usually carried out according to the two-bath method, it being rather difficult as a rule to obtain a sufficiently uniform shade on the wool, cotton and artificial silk by the one-bath method; in certain cases however the one-bath method may be followed, the dyestuffs indicated on page 314 and following pages being used for such purpose. According to the two-bath method, *fancy colours* are usually dyed first on the wool with the Acid Colours for all-wool piece-goods indicated on pages 108—120, easily levelling dyestuffs being employed to best advantage, the cotton and artificial silk being subsequently covered in a fresh bath with Diamine Colours. It is advisable to select such products as dye the different fibres as uniform a shade as possible.

The following dyestuffs are the best for covering cotton and artificial silk:

Thioflavine S	Diamine Brown M, S, ATC
Oxy Diamine Yellow TZ	Diamine Sky Blue FF
Diamine Fast Yellow	Diamine Steel Blue L
A, AGG, FF	Diamine Blue RW
Diamine Orange G, D	Diamine Bengal Blue G
Diamine Fast Orange	Diamine Fast Blue FFB, FFG
ER, EG	Diamineral Blue BF, CVB
Diamine Purpurine B, 6B	Diamine Dark Blue B
Cotton Red A	Diamine Violet N, RB, BB
Diamine Red 4B	Diamine Brilliant Violet RR
Diamine Fast Scarlet 4BF	Diamine Fast Violet BBN
Diamine Brilliant Rubine S	Diamine Heliotrope B, O, G
Diamine Bordeaux B	Oxy Diamine Violet G, BF
Oxy Diamine Brown RN	Diamine Green G
Diamine Fast Brown G, R	Isamine Blue, all brands
Diamine Catechine G, B	

The sour-dyed goods are rinsed thoroughly and taken to the topping bath charged with the requisite quantities of dyestuff, previously well dissolved, also with 8 oz to 1½ lbs Glauber's salt crystals,  $\frac{3}{8}$  oz soda and 1½—3 oz monosolvol per 10 gallons liquor. According to the depth of shade required, the topping is carried out for ½ to 1 hour in a bath of 25—30° C. (75—85° F.).

At a high temperature the Diamine Colours go more on to the artificial silk than on to the cotton; as however the artificial silk should be kept a little lighter in colour than the cotton, a temperature exceeding 30° C. (85° F.) should as a rule be avoided. The goods thus topped are rinsed very thoroughly and soured off slightly with acetic acid.

When using Isamine Blue the topping is done cold with the addition of 1 lb. Glauber's salt crystals and 3 oz acetic acid, the goods being rinsed in a bath charged with acetic acid.

In some cases it is not possible to obtain a sufficient unity of shade on both the cotton and artificial silk with Diamine Colours alone, and a subsequent shading of the artificial silk with Basic Colours is then resorted to. This is done in a cold bath slightly acidulated with acetic acid in the same way as the topping in the case of ordinary union goods.

There are certain Diamine Colours which dye a fairly solid shade on both cotton and artificial silk in a hot bath which can therefore be used for one-bath deings and shaded with neutral-dyeing wool colours. In this case it is best to dye with the addition of ½ to 1 lb Glauber's salt and 3 oz monosolvol per 10 gallons liquor at a temperature of 70° C. (160° F.) The following dyestuffs are suitable for this purpose:

Thioflavine S

Oxy Diamine Yellow TZ, CR

Diamine Fast Yellow A, AGG, B. FF, M

Diamine Orange G, D, B

Diamine Nitrazol Brown GF

Diamine Azo Scarlet B, A

Diamine Red 4B

Diamine Purpurine B.

*Blacks* are produced to best advantage in two baths the cotton and artificial silk being dyed first by the diazotising process and the wool in an acid bath subsequently. Dye for instance with abt. 8% Diaminogene B in the

starting bath and the addition of 1 lb Glauber's salt crystals and  $1\frac{1}{2}$ —3 oz monosolvol per 10 gallons liquor at 70—80° C. (160—175° F.), and diazotise and develop with Phenylene Diamine in accordance with the directions on page 267; hereafter rinse, and dye the wool in an acid bath with

Naphtylamine Black or Naphtylamine Blue Black.

In addition to Diaminogene B,

Diamine Black BH, BHN, BHF, DB, DN

Oxy Diaminogene OT, OB

are likewise very well suited for *dyeing the cotton and artificial silk first*.

By both the diazotising and the coupling process various deep fancy shades may likewise be obtained, by first dyeing the cotton and artificial silk similarly as in the case of Black, then diazotising and developing or coupling, and finally cross-dyeing the wool in an acid bath. The cotton and artificial silk should not be dyed at too high a temperature, or else the artificial silk will become too dark. Dye at about 30° C. (85° F.), diazotise, and develop or couple with Nitrazol according to the directions on pages 265 and 267, then dye with Acid Colours in the well-known manner.

When dyeing the cotton and artificial silk first, the dyestuffs indicated on pages 265—267 in the sections on "Coupling with Nitrazol" and "Diazotising and Developing" are used.

For certain shades the ground may also be dyed with *Immedial Colours*, and in such case the cotton and artificial silk are first dyed with Immedial Colours, the wool being then cross-dyed with Acid Colours. The method of working is the same as given on page 273 for dyeing the cotton first.

The following Immedial Colours dye solid shades on the cotton and artificial silk:

Immedial Yellow D

Immedial Olive 3G, B

Immedial Cutch O, G

Immedial Dark Green B

Immedial Black NNG conc.

## b) Two-Coloured Shades.

Two-coloured effects are produced in the same way as solid shades, either by dyeing the wool first with Acid Colours and the cotton and artificial silk subsequently in different shades, or, by first dyeing the cotton and artificial silk according to the diazotising or coupling process and then cross-dyeing the wool in some other shade.

## PRODUCTION OF DISCHARGEABLE DYEINGS ON UNIONS.

The best *discharging agents* for dyed unions are *Hyraldite CW extra* and *Hyraldite W*.

*Dyeing the Goods.* The dyeing is done with a combination of dischargeable Diamine Colours and Wool Colours according to the *one-bath method* as described on pages 252 and 254, either in a neutral or a slightly acid bath.

It may also be carried out by the *two-bath method*, by first dyeing the wool with easily dischargeable wool dyestuffs (see pages 138—144) and covering the cotton subsequently, or by dyeing the cotton either direct with Diamine Colours or diazotising and developing it, and cross-dyeing the wool in an acid bath.

*The dyestuffs for unions given below are easily dischargeable with Hyraldite.*

*For Yellow and Orange:*

Dyestuffs for the cotton:

- \*Diamine Yellow N, CP
- \*Diamine Fast Yellow 3G
- \*Oxy Diamine Yellow CR
- Diamine Orange F, G, D
- Oxy Diamine Orange G, R

Dyestuffs for the wool:

- \*Acid Yellow AT
- \*Fast Acid Yellow TL
- \*Fast Yellow S
- \*Orange GG
- †Indian Yellow G, R, FF
- \*†Orange extra, II, R, ENZ.

The dyestuffs marked with an asterisk (\*) are particularly easily dischargeable. The wool colours marked with a cross (†) are suitable for dyeing in a neutral bath.

*For Pink, Red and Claret:*

Dyestuffs for the cotton:

- \*Diamine Rose, all brands
- Diamine Red \*4B, \*5B \*6B, 10B
- Diamine Red D
- \*Diamine Scarlet 3B
- Diamine Fast Scarlet, all brands
- \*Diamine Fast Red F, 8BL
- Diamine Purpurine B, 3B, 6B, V
- \*Diamine Bordeaux B, S
- \*Diamine Fast Bordeaux 6BS
- Diamine Brilliant Bordeaux R
- Diamine Brilliant Rubine S
- Diamine Violet Red
- \*Diamine Azo Scarlet A, B )
- \*Diamine Azo Bordeaux B )

diazotised and developed with  
Beta Naphtol.

Dyestuffs for the wool:

- \*Lanafuchsine SG, SB, 6B, BBS
- \*Brilliant Lanafuchsine SL
- \*Scarlet FR, F2R, F3R
- \*Brilliant Scarlet GG—3R
- \*Naphtol Red C
- \*†Brilliant Cochineal 4R
- \*†Croceïne AZ
- \*†Roccelline
- \*†Azo Red A.

*For Blue:*

Dyestuffs for the cotton:

- \*Diamine Blue, all brands
- \*Diamine Sky Blue, all brands
- Diamine Pure Blue A
- \*Diamine Fast Blue, all brands
- \*Oxy Diamine Blue, all brands
- \*Diamine Brilliant Blue G
- Diamine Steel Blue L, 2206J
- Diamine Dark Blue R
- \*Diamineral Blue R, B, BF, 3B, CV, CVB, 3RC

The dyestuffs marked with an asterisk (\*) are particularly easily dischargeable. The wool colours marked with a cross (†) are suitable for dyeing in a neutral bath.

Diamine Bengal Blue G	
*Diamine Dark Blue B	
*Diaminogene B, extra	
*Diaminogene Blue NB, NA,	} diazotised and developed with Beta Naphtol.
3RN, 6RN	
*Diamine Azo Blue RR	
*Diamine Black BH	

Dyestuffs for the wool:

- \*Discharge Blue BG extra
- †Formyl Blue B
- \*Azo Wool Blue C
- \*Cyanole extra, FF
- Tetra Cyanole V, extra
- \*†Naphtol Blue G
- \*†Lanacyl Navy Blue B
- †Acid Violet 6BS.

*For Violet:*

Dyestuffs for the cotton:

- \*Diamine Violet N
- \*Diamine Heliotrope B. G. O
- \*Oxy Diamine Violet B. R. G

Dyestuffs for the wool:

- †Formyl Violet S4B
- †Lanacyl Violet B, \*BF
- \*Acid Violet 4RS
- †Acid Violet 6BS
- \*Azo Wool Violet 7R.

*For Green:*

Dyestuffs for the cotton:

- \*Diamine Green G, B, CL, FG
- \*Diamine Dark Green N
- \*Diamine Black HW

The dyestuffs marked with an asterisk (\*) are particularly easily dischargeable. The wool colours marked with a cross (†) are suitable for dyeing in a neutral bath.

Dyestuffs for the wool:

- †Indian Yellow G
- \*†Naphtol Blue G
- †Brilliant Milling Green B
- †Naphtol Blue Black
- Acid Green extra conc., extra conc. B
- †Naphtol Dark Green G

*For Olive:*

The dyestuffs mentioned for Green, shaded according to requirement with those mentioned for Yellow and Brown.

*For Brown:*

Dyestuffs for the cotton:

- \*Diamine Brown B, M, R, MR, S
- \*Diamine Brown No. 30, 38, 43
- \*Diamine Catechine G, BZ
- Diamine Catechine 3G
- \*Oxy Diamine Brown 3GN, RN

Dyestuffs for the wool:

- \*†Orange extra, ENZ
- †Indian Yellow G
- \*†Naphtol Blue G
- †Brilliant Milling Green B

*For Grey and Mode Shades, mixtures of the following dyestuffs come into consideration:*

Dyestuffs for the cotton:

- \*Diamine Grey G
- \*Diamine Fast Grey BN
- \*Diaminogene B, extra
- \*Diamine Dark Blue B
- \*Diamine Catechine BZ, G
- \*Diamine Bordeaux B
- Diamine Catechine 3G
- \*Diamine Yellow CP
- \*Oxy Diamine Yellow CR

The dyestuffs marked with an asterisk (\*) are particularly easily dischargeable. The wool colours marked with a cross (†) are suitable for dyeing in a neutral bath.



## Dyestuffs for the wool:

- †Formyl Blue B
- \*†Naphtol Blue G
- †Lanacyl Violet B, \*BF
- \*†Azo Red A
- †Indian Yellow G
- †Naphtol Blue Black
- \*†Orange extra

*For Black:*

## Dyestuffs for the cotton:

- \*Union Black S, B
- \*Diamine Jet Black SS, Cr, OO, RB
- \*Diamine Fast Black F, X, XN extra conc.
- \*Oxy Diamine Black A, SA, FFC, US, UI
- \*Oxy Diamine Black JE, JEI, JB, JW, JWF
- \*Para Diamine Black B, BB, FFB
- Diamine Black RMW (only for coloured discharges)
- \*Diamine Black BH, BHF, DB, diazotised and developed  
with Phenylene Diamine.
- \*Duatol Discharge Black KP

## Dyestuffs for the wool.

- \*Discharge Black BF extra
- †Naphtol Blue Black
- \*Naphtylamine Black EFF
- \*†Lanacyl Navy Blue B

Full particulars regarding the preparing of discharges are to be found on pages 212—213 of our “Manual of Dyeing”, Vol. IV (Printing).

The dyestuffs marked with an asterisk (\*) are particularly easily dischargeable. The wool colours marked with a cross (†) are suitable for dyeing in a neutral bath.

## THE APPLICATION OF ACETATE OR FORMATE OF SODA ON UNION FABRICS.

When dyeing union fabrics in an acid bath, a portion of the acid is apt to remain in the goods in spite of the most careful rinsing and thus to exercise a detrimental effect on the goods when stored.

With a view to neutralising any ill effect of the acid on the cotton, it is well to pass the goods after rinsing through a cold bath containing 4—8 oz acetate or formate of soda per 10 gallons, and to dry then without rinsing again.

The same treatment may be applied to good advantage for unions which have been bleached with sulphurous acid or in the stoving chamber.

This aftertreatment is necessary particularly in the case of union fabrics the cotton portion of which has been dyed with a Sulphide Black.

The impregnating of the goods with acetate or formate of soda may be done in the washing machine or on a padding machine. In the latter case the trough is charged per 10 gallons water with 8 oz of one of the salts mentioned, and for replenishing purpose another 2% of these salts, calculated on the weight of the goods, should be gradually added to the bath. The goods treated in this manner are dried without rinsing.

DYEING OF WOOL AND SILK MIXED GOODS.

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# DYEING OF WOOL AND SILK MIXED GOODS.

## *Dyeing of Gentlemen's Suitings.*

(See pages 145 to 149).

## *Dyeing of Ladies' Costume Cloths.*

**Preparatory Treatment.** The preparatory treatment to be adopted is dependent entirely upon the character of the cloth, and more particularly upon the kind of silk interwoven in the goods. Cloths containing chappe or organzine silk are treated in the same way as light all-wool materials, that is to say, they are singed, crabbed, steamed and then cleaned by washing with soap and the addition of ammonia or soda; goods containing a grège warp such as bengaline, eolienne and gloria on the other hand are degummed in a boiling hot neutral soap bath after the crabbing, then carefully rinsed, and if necessary steamed. For bright shades the goods are moreover as a rule bleached with hydrogen or sodium peroxide.

With a view to obtaining the highest possible lustre on the silk and faultlessly pure dyeings, the use of pure and soft water for all the different operations must be specially borne in mind.

**Dyeing.** Fabrics consisting of wool and silk are dyed both in solid and in two-coloured shades. The vessels employed for the dyeing are vats as commonly used for wool-piece dyeing, steam driven, or worked by hand for materials which are more difficult to handle. After the dyeing, the goods are rinsed, brightened with acetic or formic acid, dried on a tentering frame, if necessary evenly expanded on a frame, and then lightly pressed between boards. Inferior qualities are gummed slightly before the drying.

### I. Solid Shades.

Solid shades may be dyed on the wool and silk, either

a) with Acid Colours, which are used principally, and are available for practically any shade, or

b) with Diamine Colours which are used especially for the production of dyeings fast to water and washing, as well as for fabrics containing vegetable impurities.

### A. Dyeing with Acid Colours.

For the production of solid shades on wool and silk, Acid Colours are used in strongly acid baths, by this method the two fibres being dyed best to the same shade.

Next to the selection of the dyestuffs best suited for solid shades, the most essential point is to *regulate adequately the temperature of the dyebaths*.

The silk is best dyed below boiling heat at abt. 70° C. (160° F.); the wool on the other hand is best dyed at boiling temperature; if the boiling is maintained, it even strips a portion of the dyestuff absorbed by the silk.

In order therefore to dye the silk as far as possible the same depth of shade as the wool, a prolonged boiling should be avoided, the goods being run at the boil only, or at a temperature approaching boiling point. If necessary, the silk may be covered in the cooling bath by adding some dyestuff or in a fresh, cold bath in accordance with the directions on pages 362 and 366.

When sampling, the wool should always be kept on the light side of the pattern, because it will necessarily absorb a little more dye in the subsequent topping of the silk. As the wool absorbs considerably more dyestuff in a hot than in a cold bath, preference should as a rule be given to topping in a fresh, cold bath, particularly when the wool has already attained the desired depth of shade.

For full tones, particularly for dyeings which in the main are produced with one dyestuff only, a portion only of the requisite dyestuff and acid is sometimes added in the beginning, the wool being dyed at the boil, approximately to the shade required. The bath is then cooled off to 60° C. (140° F.) or lower, by allowing cold water to flow in, dyestuff and acid being then added according to requirement and the goods being run until the silk has attained the shade of pattern.

For compound shades and mode shades this method is not however very advantageous; in these cases the wool is dyed to the shade of pattern regardless of the shade of the silk, the latter being dyed in a fresh, cold bath according to the particulars on pages 362 and 363.

#### *Method of Dyeing:*

Dye with the addition of

10% Glauber's salt crystals and 10—15% bisulphate of soda or  
30% Glauber's salt crystals and 4—5% sulphuric acid,

enter the goods at about 60° C. (140° F.), raise to the boil within ½ hour, and boil gently for another ½ hour. It depends now on the appearance of the wool and the silk whether the goods should be dyed for another ½ hour boiling hot or in the cooling bath, if necessary with the addition of some more dyestuff, or, if the silk has to be topped in a fresh, cold liquor, according to the directions on pages 362 and 363.

The Acid Colours and combinations mentioned below are given the preference in the dyeing of solid shades:

*For Cream, Yellow and Orange:*

China Yellow B  
Fast Acid Yellow 3G (excellently fast to light)  
Indian Yellow G, FF, R  
Tropaeoline RNP  
Orange EN, R, extra

*For Pink:*

Rosazeine B  
Irisamine G  
in combination with  
Acid Magenta

*For Red and Claret:*

Azo Orseille KWS (particularly well suited)  
Brilliant Croceine, all brands  
Croceine AZ  
Scarlet EC  
Roccelline  
for Claret saddened with  
Acid Violet 6BS, 6BC  
Tetra Cyanole V, extra

*For Violet:*

Formyl Violet S4B, 4BF, 6B, 10B  
Acid Violet 6BS, 6BC

*For Blue:*

Cyanole FF, extra (chiefly for light shades)  
Tetra Cyanole V, SF, A, extra  
Brilliant Milling Blue B  
Formyl Blue B  
Pure soluble Blue  
Water Blue B, R  
Alkaline Blue, all brands

*For Navy Blue:*

Navy Blue KWSG, KWSR  
Solid Blue R, 3R (for better fastness to light)  
shaded with  
Tetra Cyanole V, extra  
Acid Violet 6BS  
Azo Orseille KWS  
Orange extra

*For Green:*

Cyanole Fast Green G  
Brilliant Milling Green B  
Acid Green extra conc.  
shaded with  
China Yellow B  
Indian Yellow G, FF  
Tetra Cyanole A  
Acid Violet 6BS  
for Dark Green saddened with  
Navy Blue KWSG, KWSR  
Orange EN

*For Grey and Mode shades:*

Combinations of  
Tetra Cyanole V  
Cyanole Fast Green G  
Indian Yellow G  
Orange extra  
Azo Orseille KWS

*For Brown and Olive:*

Combinations of  
Tetra Cyanole V  
Brilliant Milling Green B  
Indian Yellow G, FF  
Tropaeoline RNP  
Orange extra  
Azo Orseille KWS



*For Black:*

*Alphanol Black BG, 3BN, K4B	}	for Blacks with a bluish cast.
*Gloria Black B		
*Neutral Wool Black 4B		
Naphthylamine Black 4B, 6B		
shaded with		
Formyl Violet S4B, 6B, 10B		
Formyl Blue B		
Brilliant Milling Blue B	}	for more covered Blacks.
Brilliant Milling Green B		
*Alphanol Black KWAN conc., KV		
*Gloria Black I, II		
Neutral Wool Black B, G		
shaded with		
Indian Yellow G, R		
Tropaeoline RNP		

The dyestuffs marked with an asterisk (\*) are dyed with the addition of

10% Glauber's salt crystals and

10% acetic acid or 2.5% formic acid 85%.

Enter the goods at 60° C. (140° F.), raise the temperature to the boil within ½ hour, then boil gently for ½ hour, and run for another half hour without steam.

For light, clear shades, some of the Acid Colours may also be used, dyed in weakly alkaline soap baths, particularly on goods previously bleached by means of peroxide of hydrogen, whereby purer shades are obtained than in acid baths.

Particularly well suited are the following dyestuffs:

Alkaline Blues, all brands	Rosazeïne B
Alkaline Violet CA, C	Indian Yellow G, FF, R
Formyl Violet S4B	Orange EN
Brilliant Milling Blue B	Brilliant Milling Green B.

Dye in a gently boiling bath with the addition of 1½—2 lbs soap and 1—2 lbs phosphate of soda per 100 gallons liquor, in the case of Alkaline Blue with the addition of 3—5% borax or both borax and soap together. By adding 2—5 lbs Glauber's salt per 100 gallons liquor, a better affinity of the dyestuffs will be ensured.

Hard water should be corrected with a little soda, but an excessive quantity should be avoided as the wool is then apt to assume a yellowish appearance.

The dyebath may be preserved for further use; it is sufficient for the subsequent baths to add only one-fifth of the quantities of soap, phosphate of soda and borax used for the starting baths.

The goods should always be rinsed thoroughly after dyeing, then brightened gently with formic acid, and dried; Alkaline Blue dyeings, after well rinsing, are raised in a hot bath acidulated with sulphuric acid.

### B. Dyeing with Diamine Colours.

Diamine Colours are likewise used very largely for solid shades on wool and silk mixed goods, as they readily dye solid on the two different fibres, yielding at the same time dyeings of excellent fastness to water and washing. Any cotton or burls contained in the material are covered by the Diamine Colours.

It is of importance also to regulate the temperature carefully, because the Diamine Colours go strongly on to the wool at the boil, whereas at about 60° C. (140° F.) or less, practically the silk only is dyed. By prolonged boiling the wool chiefly is dyed and at 60° C. (140° F.) or below almost alone the silk.

The Diamine Colours are dyed in a neutral Glauber's salt bath, the blue brands excepted which exhaust best by the addition of some acetic acid. The baths are not quite exhausted, particularly in the case of full shades, and are preserved for further use. In a standing bath, three-quarters to four-fifths of the quantities of dyestuff required for the starting bath are as a rule sufficient, and one-fifth of the Glauber's salt. Hard water should be debarred as far as possible.

#### *Method of Dyeing.*

Dye with the addition of

8 oz — 2 lbs Glauber's salt crystals per 10 gallons  
(depending on the depth of shade);  
enter at about 60° C. (140° F.), raise gradually to the  
boil, work for about an hour in a boiling or gently  
boiling bath, rinse, and brighten slightly with acetic  
or formic acid. Blue Diamine Colours are dyed in the same  
manner, with the addition of 20% Glauber's salt and 2—4%  
acetic acid.

The silk, if not in agreement with pattern, is best brought to shade in a cold acetic acid bath according the particulars on pages 362—363.

The following Diamine Colours and combinations of such are particularly well suited for the purpose:

*For Cream, Yellow and Orange:*

Diamine Fast Yellow FF, 3G  
Diamine Yellow CP  
Oxy Diamine Yellow TZ  
Diamine Orange F, B

*For Pink:*

Diamine Rose BD, GD

*For Red and Claret:*

Diamine Scarlet B, 3B  
Diamine Red 4B, 5B  
Diamine Fast Red F, 8BL  
Diamine Bordeaux S

*For Violet:*

Diamine Fast Violet FFBN, BBN  
Diamine Violet N  
Oxy Diamine Violet B, R

*For Blue and Navy Blue:*

Diamine Sky Blue FF  
Diamine Blue RW  
Oxy Diamine Blue 5G, 3G, G, B, R  
Diamine Brilliant Blue G  
Diamine New Blue G, R  
Diamine Steel Blue L

*For Green and Olive:*

Diamine Green FG, G, B, CL  
Diamine Dark Green N  
for Olive, shaded with  
Diamine Yellow CP  
Diamine Orange F  
Diamine Brown 3G.

*For Grey and Mode Shades:*

Combinations of

Diamine Black DN  
 Diamine Fast Yellow FF  
 Diamine Catechine 3G, G  
 Diamine Brown R  
 Diamine Fast Red F, 8BL  
 Diamine Fast Violet BBN

*For Brown:*

Diamine Catechine 3G, G  
 Diamine Brown 3G, R, M, B, V  
 Diamineral Brown G  
 Oxy Diamine Brown G, 3GN  
     shaded with  
 Diamine Yellow CP  
 Diamine Black DN, HW

*For Black:*

Diamine Black DN  
 Oxy Diamine Black JB, JWF.

## II. Two-Coloured Effects.

Two-coloured effects are produced on fabrics composed of wool and silk by first dyeing the wool with Acid Colours which go principally on to the wool fibre and stain the silk as little as possible, and then dyeing the silk cold in a second bath.

If the silk has absorbed too much dyestuff by the wool-dyeing so that it does not appear clear enough or so that clear shades are not obtainable on the silk in the subsequent dyeing, it has to be cleared by a special treatment as indicated on pages 361 and 362.

a) Dyestuffs for Dyeing the Wool first.

*For Cream, Yellow and Orange:*

Naphtol Yellow S  
 Fast Acid Yellow TL  
 Acid Yellow AT

Fast Yellow S  
 Orange GG  
 Lanafuchsine SG  
 Brilliant Lanafuchsine SL (for shading towards red).

*For Pink:*

Eosine 3G, BN  
 Eosine Scarlet B  
 Lanafuchsine SG, SB  
 Brilliant Lanafuchsine SL  
 Brilliant Scarlet 4R, 6R

*For Red and Claret:*

Brilliant Lanafuchsine SL	} best suitable for the purpose
Lanafuchsine SG, SB, 6B	
Brilliant Scarlet 4R	
Naphtol Red C	
Amaranth	
Brilliant Scarlet 6R	
Crystal Scarlet 6R	
Scarlet FR, F2R, F3R	
Brilliant Cochineal 2R	
Acid Magenta (in light shades).	

*For Violet:*

Azo Wool Violet 7R  
     shaded with  
 Alizarine Cyanole EF  
 Azo Wool Blue C  
 Cyanole FF (for bright pale shades).

*For Blue and Navy Blue:*

Cyanole FF, extra (for light and medium blue)  
 Alizarine Cyanole EF  
 Azo Wool Blue C (for fuller shades)  
     shaded with  
 Lanafuchsine 6B  
 Azo Wool Violet 7R  
 Orange GG  
 Fast Acid Yellow TL.

*For Green:*

Acid Green extra conc.  
 Acid Green 5G  
 Naphtol Green B (for dark green)  
     shaded with  
         Alizarine Cyanole EF  
         Azo Wool Blue C  
         Acid Yellow AT  
         Orange GG.

*For Compound Shades (Grey, Mode, Brown, Olive):*

Combinations of  
 Alizarine Cyanole EF  
 Azo Wool Blue C (for deep shades)  
 Acid Yellow AT  
 Fast Acid Yellow TL  
 Orange GG  
 Brilliant Lanafuchsine SL

*For Black:*

Naphtylamine Black EFF  
     shaded with  
         Azo Wool Violet 7R (for blue-black)  
         Acid Yellow AT }  
         Orange GG        } for jet black.

*Dyeing Directions for Fancy Colours.*

Charge the dyebath with

10% Glauber's salt crystals,  
 8—15% acetic acid 30%  
                                     or

2— 3% formic acid 85%

and the requisite quantity of dyestuff; enter the goods straightaway into the boiling bath, boil well for about an hour, hereafter rinse well and brighten with acetic or formic acid in the last rinsing bath.

For *Eosine* and *Eosine Scarlet*, charge the dyebath with

10% Glauber's salt crystals,  
 2— 5% acetic acid 30% and the requisite dyestuff.

Enter the goods at 50—60° C. (120—140° F.), raise to the boil within  $\frac{1}{2}$  hour, boil for 30 to 40 minutes, rinse, and brighten as indicated before.

*A very small percentage of acid and a high temperature of the dye-liquor are conducive to the clearness of the silk; on the other hand the silk will become more or less strongly stained by using strong acid baths or by dyeing at a temperature below the boil.*

In order to attain as high a temperature as possible in the dyebath, a second steam-coil may be introduced into the dye vessel, most advantageously into that part which holds the goods.

### *Dyeing Directions for Black:*

Charge the bath with

- 10% Glauber's salt crystals
- 2% formic acid 85% and for instance
- 8% Naphtylamine, Black EFF;

enter the goods at boiling temperature, and after  $\frac{3}{4}$  hour's boiling, add

2% formic acid 85%

in several portions. Work for another 20 to 30 minutes in the strongly boiling bath, and finally rinse.

### b) Clearing the Silk.

The dyestuffs and combinations enumerated above have been selected for leaving the silk in pale and medium shades almost entirely unstained. When dyeing deep shades it is practically impossible to prevent the silk from becoming slightly tinted, and it may therefore be necessary to subject the materials subsequently to a clearing process in order to strip the dyestuff which the silk has absorbed.

For this purpose the pieces are entered into a fresh bath of 60—80° C. (140—175° F.) to which  $\frac{1}{2}$ —1 oz oxalate of ammonia per 100 gallons liquor has been added, and are allowed to run for 10 to 20 minutes in this bath until the silk is sufficiently decolourised; they are then rinsed, and brightened.

If very soft or condensed water is used, the oxalate of ammonia may be omitted, the silk being cleared simply in plain water.

More effective stripping may, if necessary, be attained by adding about  $1\frac{1}{2}$  oz acetate of ammonia\* per 10 gallons liquor; similar good results are also obtained with bran.

By the first method the wool loses only very little colour or none at all; by employing the second, more effective method, however, some of its colour is lost, which fact has to be taken into account in the dyeing.

In dyeing *black and white effects* with *Naphtylamine Black EFF*, the silk assumes a slightly bluish grey shade, which is removed with hydrosulphite solution by the following method:

Prepare a bath of 40—45° C. (105—115° F.) with

2 gallons acetic acid 30%	}	per 100 lbs of goods.
$2\frac{1}{2}$ —3 gallons hydrosulphite solution**		

Enter the goods immediately, and work until the silk is sufficiently white (about 20 to 30 minutes). Then rinse thoroughly, sour off cold in a bath containing about 5% sulphuric acid, calculated on the weight of the goods, rinse again, and brighten finally with acetic or formic acid.

If necessary the silk may be lightly blued with small quantities of Formyl Violet, Brillant Milling Blue or Water Blue added to the brightening bath.

It is advisable to expose the goods as little as possible to the air during the stripping process, keeping them entirely immersed in the stripping liquor and moving them slowly to and fro with a stick.

#### c) Dyestuffs for Dyeing the Silk subsequently.

In the case both of solid shades and of two-coloured goods the subsequent dyeing of the silk is carried out in a cold weakly acid bath with dyestuffs which go strongly on to the silk and which stain the wool fibre as little as possible. It is helpful to the dyeing of the silk to warm the

\* For the preparation of acetate of ammonia see appendix.

\*\* Preparation of the hydrosulphite solution:

1 gallon bisulphite 66° Tw. is mixed with  
1 gallon cold water, into which is slowly stirred  
1 lb zinc dust.

The lot is stirred for a short time, allowed to settle, filtered if deemed necessary, and the clear solution used.

As the hydrosulphite solution decomposes rapidly and becomes ineffective, it should always be prepared shortly before use and added to the bath just before the goods are entered.



liquor a little, say up to about 30—45° C. (85—115° F.), but at such temperature the wool is stained to some extent also.

The following Acid, Diamine and Basic Colours come into consideration as suitable dyestuffs for the purpose:

a) *Acid Colours:*

Milling Yellow O, OO	Acid Violet 6BS
Tropaeoline RNP	Acid Green extra conc.
Brilliant Croceïne,	Brilliant Milling Green B
all brands	Brilliant Milling Blue B
Croceïne AZ	Cyanole FF
Milling Red FR	Tetra Cyanole V, SF
Azo Orseille BB	Water Blue B
Lanafuchsine 6B	Lanacyl Blue BN, RN
Amaranth B	Naphtol Blue G
Acid Magenta	Naphtol Blue Black
Rosazeïne B	Naphtylamine Black ESN
Formyl Violet S4B, 4BF	

b) *Diamine Colours:*

Oxy Diamine Yellow TZ	Diamine Heliotrope B
Diamine Yellow CP	Diamine Sky Blue, FF
Oxy Diamine Red S	Diamine Blue 2B, 3B
Diamine Rose BD, GD	

c) *Basic Colours:*

Thioflavine TCN	Safranine, all brands
Paraphosphine G	Tannin Heliotrope
Tannin Orange R	New Methylene Blue N
Chrysoidine F	Solid Green Crystals O.
Bismarck Brown GG	

Dye for  $\frac{1}{2}$  to  $\frac{3}{4}$  hour in a short liquor, cold or luke-warm, with the addition of 10—15% acetic acid or 2—3% formic acid 85%, and for Diamine and Basic Colours 5% acetic acid. Hereafter rinse, and brighten.



DYEING OF HALF-SILK  
(COTTON AND SILK).

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## DYEING OF HALF-SILK

(COTTON AND SILK).

The goods to be dyed, either piece-goods or ribbon, are first of all singed on the gas-singeing machine, then degummed in a boiling hot soap bath (1—2 lbs olive-oil soap per 10 gallons) in order to bring out the natural lustre of the silk. It is essential to use soft water, both for the soap bath and for the subsequent rinsing baths. In some instances, the goods are bleached with peroxide of hydrogen or sodium before dyeing, particularly in the production of very pale shades.

In both solid and in two-coloured styles half-silk is usually dyed with *Diamine Colours*; in some cases *Basic Colours* are likewise used, on a tannic acid mordant, particularly for bright shades of pink, red, green and violet. For blacks and two-coloured styles, *Immedial Colours* moreover are used when particularly good fastness is required. *Acid* or *Basic Colours* serve for topping or shading.

For dyeing, ordinary rectangular wooden vats are used in which piece-goods are drawn over a rotating winch; superior qualities are frequently also dyed on the jigger. Ribbons are hung in skeins on rods and worked in the liquor, or are dyed over a winch.

Particulars of the dyestuffs used in practice and their behaviour towards the silk and cotton fibres respectively will be found in the following tables.

# HALF-SILK DYEING.

Diamine Colours which dye the silk and cotton the same or approximately the same shade.

Thioflavine S	Diamine Catechine G, 3G
Oxy Diamine Yellow GG, TZ, NY200	Diamineral Brown G
Diamine Fast Yellow B, M, FF, 3G	Diamine Blue RW
Diamine Yellow CP, N Powder	Diamineral Blue B, 3B
Diamine Orange B, F	Diamine Bengal Blue G
Diamine Fast Orange EG, ER	Diamine Steel Blue L
Oxy Diamine Orange G, R	Diamine Dark Blue B
Diamine Rose BD, GD, BG, FFB	Diamine Grey G
Diamine Scarlet B, 3B, 6B. V	Diamine Green G, B, CL, GF
Diamine Red 4B, 5B, 6B, 10B, D, DN	Diamine Dark Green N
Diamine Violet Red	Diamine Black HW
Diamine Fast Red F, 8BL	Union Black
Diamine Bordeaux B, S, VRO	Union Black S
Diamine Brill. Bordeaux R	Oxy Diamine Black JE, JEI, JB, JW, FFC, BM, UI, US
Diamine Brown 3G, 5G, M, MR, BWA, GWA, 30a, 33, 36, 37, 41, 42a, 43	Para Diamine Black FFD extra conc.
Oxy Diamine Brown G, 3GN, RN	Diaminogene B, BR
	Oxy Diaminogene
	OT, FFN, FFG, EM
	Diamine Black
	BH, DB

} diazotised and developed

For dyeing directions see opposite page.

## DYEING OF HALF-SILK.

Diamine Colours which dye silk and cotton more or less varying shades,  
or cotton deeper shades than silk.

Diamine Brilliant Scarlet S	Oxy Diamine Violet B, G, R,
Diamine Fast Bordeaux GBS	BF
Diamine Brilliant Blue G	Diamine Heliotrope O, B, G
Diamine Blue BX, 2B, 3B,	Diamine Brilliant Violet RR, B
BG, NC, 52, 53, 55, 56	Diamine Fast Violet
Diamineral Blue R, CV, CVB,	FFBN, FFRN, BBN
BF, 3RC	Diamine Bronze G
Diamine Bengal Blue R	Diamine Brown B, R, S, ATC
Oxy Diamine Blue 5G, 3G,	Diamine Catechine B
G, B, R, 3R	Diamine Fast Brown R, G, GB
Diamine Azo Blue R, 2R, 51,	Diamine Black BH, BHF,
54	BHS conc., RO
Diamine Deep Blue B, R	Oxy Diamine Black SOOO,
Diamine Fast Blue G, FFB,	A, D, AM
FFG, BN	Para Diamine Black B, BB,
Diamine Violet N, BB	FFB.

### DYEING DIRECTIONS FOR FANCY COLOURS.

#### Dye

light shades with		medium and deep shades with		}	per 10 gallons liquor.
Soap	3—6 oz	3—6 oz			
Soda	$\frac{3}{4}$ —1 $\frac{1}{2}$ oz	$\frac{3}{4}$ —1 $\frac{1}{2}$ oz			
Glauber's salt crystals	0—8 oz	1—2 lbs			

Use water as soft as possible, boil up the bath charged with the dyestuff and all additions, and dye for about 1 hour. In the case of light shades it is advisable to work at a temperature of only 50—60° C. (120—140° F.); further, for light colours the Glauber's salt should to advantage be replaced by an equal to double quantity of phosphate of soda. By heating to a higher temperature the silk is dyed a deeper shade, whilst the cotton is better covered in a cooling bath. After dyeing, rinse in soft water or in water containing some soda, brighten with acetic acid, and dry, or if necessary top and shade in an acetic acid bath with basic or acid colours (see pages 370 and 371).

### DYEING DIRECTIONS FOR BLACK

(see page 372).

## DYEING OF HALF-SILK.

Diamine Colours which dye silk little or not at all, but cotton strongly, and which are suited for the production of two-coloured effects.

Diamine Fast Yellow A, AGG	
Diamine Sky Blue FF, FFN, FFS	
Diamine Pure Blue A	
Diamine Orange D, G	
Diamine Fast Scarlet GFF,	} especially for light shades
4BFF, 5BFF, 7BFF	
Diamine Brilliant Rubine S	
Direct Rose T	
Diamine Blue 2B, 3B	
Diamine Black BH, BHF,	
RMW, BHS conc.	

dyed direct or diazotised and developed with Phenylene Diamine, Beta Naphtol or Resorcine.

### DYEING DIRECTIONS.

Dye at 50—80° C (120—175° F.) with

$\frac{1}{2}$  to 1 lb soap  
 $1\frac{1}{2}$ —3 oz soda  
 0 —1 lb Glauber's salt crystals  
 per 10 gallons liquor.

At a higher temperature the silk is stained more severely, whilst at a low temperature the cotton principally is covered.

If the cotton is to be dyed black and the silk to remain undyed, dye as above described with Diamine Black BH, BHF or BHS conc., for jet black with the addition of some Diamine Orange D or Diamine Fast Yellow A. After rinsing, diazotise, and develop as indicated on page 372. In the place of Phenylene Diamine, Beta Naphtol and Resorcine at equal parts, dissolved with  $1\frac{1}{2}$  times the quantity of caustic soda lye, are frequently used; in the case of Phenylene Diamine, the developing bath must always react alkaline, and the treatment in this bath should be as short as possible.

Acid Colours which go only on to silk, and stain cotton not at all or only slightly.

\*Milling Yellow O  
 Indian Yellow G, R, FF  
 Orange II, ENZ, GG  
 Brilliant Croceine, all brands  
 \*Scarlet FR, F2R, F3R  
 Crystal Scarlet 6R  
 \*Acid Magenta, Rosazeine B  
 \*Roccelline, Wool Red B  
 \*Azo Rubine A, \*Milling Red G, R  
 Water Blue, all brands  
 Solid Blue R, 3R  
 \*Tetra Cyanole, all brands  
 Cyanole extra, Formyl Blue B  
 \*Brilliant Milling Blue B  
 \*Brilliant Milling Green B  
 \*Acid Green extra conc., B, 5G  
 \*Formyl Violet S4B  
 \*Acid Violet 4RS  
 \*Azo Wool Violet 7R  
 \*Naphtol Blue R  
 Aniline Grey, Nigrosine  
 \*Naphthylamine Black S  
 \*Naphthylamine Blue Black B, 5B.

### DYEING DIRECTIONS.

As a rule all the Acid Colours (see pages 216 and 217) may be applied, but the above are particularly well suited for the purpose. For dyeing silk previously, work in a boiling hot bath with the addition of 3—5% sulphuric acid, for subsequent shading at a temperature of 30—50° C. (85—120° F.).

If the cotton is to turn out perfectly white, the goods should after the dyeing of the silk and rinsing in a lukewarm bath be treated in a lukewarm bath of Eau de Javelle. For Eau de Javelle see page 403.

The dyestuffs marked with an asterisk (\*) are of good fastness to chloring, and therefore suited for producing clear white cotton effects.



## DYEING OF HALF-SILK.

Basic Colours suited for topping and shading in fresh baths or to be used on a preliminary mordant of tannin and antimony.

Immedial Colours suited for the production of solid shades of particular fastness.

Thioflavine T, TCN  
 Paraphosphine G, R  
 Tannin Orange R Powder  
 Chrysoidine Crystals, FN  
 Safranine, Magenta, all brands  
 Tannin Heliotrope  
 Cerise Ia  
 Methyl Violet, all brands  
 Crystal Violet 5B bluish, 10B  
 New Methylene Blue N, GG, R, 3R  
  
 New Blue R, B, L  
 Indazine M  
 Solid Green Crystals O  
 Brilliant Green Crystals extra  
 Bismarck Brown FF, FFG

Immedial Yellow D, GG  
 Immedial Orange C  
 Immedial Cutch O, G, BG, BGG  
 Immedial Brown B, BR, RR  
 Immedial Dark Brown D conc.  
 Immedial Maroon B conc.  
 Immedial Bordeaux G conc.  
 Immedial Red Brown 3R  
 Immedial Prune S  
 Immedial Indogene B conc.  
 Immedial Direct Blue B, R, OD  
 Immedial Green Blue CV  
 Immedial Dark Green B  
 Immedial Olive B, GG, 3G  
 Immedial Yellow Olive G, 5G  
 Immedial Green Yellow G  
 Immedial Black AZ  
 Immedial Black BZ conc.  
 Immedial Black FF extra

### DYEING DIRECTIONS.

The above-mentioned Basic Colours are used either alone or together with Acid Colours for the topping of dyeings bottomed with Diamine Colours as per directions on page 369, or for producing very bright shades by dyeing on a tannin and antimony mordant.

In the former case dye cold to lukewarm with the addition of 5—10% acetic acid or 3—5% hydrochloric acid, rinse, and brighten.

For the production of very bright solid or two-coloured shades previously dye the silk with suitable Acid Colours (see page 370) boiling hot, rinse, and then treat for 3 to 6 hours in a warm bath of 30° C. (85° F.) being as short as possible, and containing 3—5% tannin of the weight of the goods. Hereupon pass through a cold antimony salt bath (2—4% of the weight of the goods), rinse, and dye cold with Basic Colours. In the case of two-coloured effects subsequent hot soaping is frequently necessary in order to clear the silk.

Immedial Black BZ is dissolved with double the quantity, the rest of the above dyestuffs with the same quantity of sodium sulphide crystals as of dyestuff.

### DYEING DIRECTIONS FOR SOLID SHADES (FANCY COLOURS):

(for Black see page 373.)

Dissolve the dyestuff with the requisite quantity of sodium sulphide and double to three times the quantity of glucose as of sodium sulphide, boil up for 5 to 10 minutes, add this solution to the dyebath which should be as short as possible, and charged with 3 oz soda, 3 oz Turkey-red oil and 1 lb Glauber's salt per 10 gallons, and dye for about 1 hour at 80—90° C. (175—195° F.). Hereafter lift quickly, rinse, and brighten in acetic acid. The topping is carried out as described in the opposite column.

For the production of two-coloured effects see page 374.

## DYEING DIRECTIONS FOR BLACKS.

### a) For Blacks dyed direct:

Union Black S  
Oxy Diamine Black JE, JW, JB, FFC, BM, UI, US  
Para Diamine Black FFD conc.

shaded with

Diamine Dark Green N  
Diamine Fast Yellow A, B, FF.

Dye boiling hot for 1 to  $1\frac{1}{2}$  hours with

7	—10	% dyestuff	} per 10 gallons liquor.
0	— $1\frac{1}{2}$ oz	soda ash and	
$1\frac{1}{2}$	— 3	lbs Glauber's salt crystals	

After dyeing, rinse, and then top with New Methylene Blue N or else with Naphthylamine Black 4B, 6B, Neutral Wool Black B, G in a lukewarm bath weakly acidulated with acetic acid.

### b) For Blacks diazotised and developed:

Diaminogene B, BR  
Oxy Diaminogene OT, FFN, FFG, EM  
Diamine Black BH, DB  
Diamine Neron BB

shaded with

Diamine Dark Green N  
Diamine Fast Yellow A, B, FF  
Neutral Wool Black B, G  
Naphthylamine Black 4B.

Dye boiling hot for 1 to  $1\frac{1}{2}$  hours with

0— 2	% acetic acid	} reckoned on the weight of the goods, as well as
8—10	% dyestuff	
2— 3	lbs Glauber's salt crystals	

per 10 gallons liquor.

Then rinse cold, treat with 3% nitrite and 6% sulphuric acid in a cold bath, rinse again, developing in the case of Jet Black with 0.7% Phenylene Diamine and 2% soda, and of Blue-Black with 1.2% Beta Naphtol, dissolved with equal quantity of caustic soda lye 77° Tw.; finally soap hot with the addition of a little New Methylene Blue N.

Diamine Black DB and Diamine Neron BB are to better advantage dyed with the addition of Glauber's salt only, without acetic acid.

c) For Blacks produced with Immedial Black.

For dyeing Blacks on half-silk materials, Immedial Black AZ and BZ conc. applied according to our patented process (British Patent No 24697/01) have proved particularly well adapted. They dye a shade in no way inferior to Aniline Oxidation Black, the output moreover being very much larger in the case of our products, besides which the latter do not affect the fibre nor become bronzy or turn greenish on storing.

Dye in 30 to 40 times the quantity of liquor calculated on the weight of the goods charging the bath with

2½ lbs Immedial Black AZ or	} per 10 gallons liquor.
1½ lbs Immedial Black BZ conc.	
2½ lbs sodium sulphide crystals	
5—6 lbs glucose	
3 oz soda ash	
3 oz Turkey-red oil	}
½—1 lb Glauber' salt desiccated	

Boil all the ingredients up together for 5—10 minutes, enter the goods, and dye for 1 to 1½ hours; then squeeze off lightly, and rinse immediately in a cold bath to which a little soda has been added, and rinse again in warm water. Then treat the goods for about ¾ hour in a boiling hot bath with 3% bichrome, 2% lactic acid and 5% acetic acid, rinse, and dye boiling hot with logwood extract, in a fatty soap bath, if necessary adding a little fustic extract. For shading, either *Diamine Colours* such as Diamine Yellow CP, Oxy Diamine Orange R, Cotton Brown N, Diamine Green CL, etc. or *Basic Colours* such as New Methylene Blue N, 3R, Safranin S No 150, Tannin Heliotrope, Solid Green crystals are used. The goods are then dried without again rinsing.

For dyeing subsequent lots in a standing bath, the following quantities are required:

14—18 % Immedial Black AZ or	} of the weight of the goods to be dyed.
8—10 % Immedial Black BZ conc.	
14—18 % sodium sulphide crystals	
14—18 % glucose	
0.5% soda ash	
1 % Turkey-red oil	
0—5 % Glauber's salt crystals	

Ribbons are best dyed on bent iron rods wrapped round with cloth, being turned about every 10 minutes by means of a broaching stick. Piece-goods are passed into the liquor and turned every 10 or 15 minutes; the goods should always be kept well immersed in the liquor.

The brand Immedial Black AZ is suitable for bluish blacks and BZ conc. for jet blacks.

## Directions for Dyeing Two-Coloured Half-Silk Materials with Immedial Colours.

For producing the well-known black and white (Grisaille) style the following method (British Patent No 14581/02) is largely applied, and may only be used with our consent.

Charge the dyebath in an ordinary wooden vat, provided with a moveable winch which must not be fixed not too high above the vat, with

1—2 lbs Immedial Black NF	}	per 10 gallons liquor.
1—2 lbs sodium sulphide crystals		
2—4 lbs glue		
8 oz soda ash		
2 lbs Glauber's salt crystals		

Dye the previously *mercerised* goods for  $\frac{3}{4}$ —1 hour at 30—40° C. (85—105° F.), turning them occasionally and keeping them otherwise well immersed in the liquor. Then press off lightly, and rinse in cold water charged with about 3 oz soda and 4—5 oz glue, soap hot if necessary, and brighten with the addition of 8 oz acetate or formate of soda per 10 gallons liquor.

For dyeing subsequent lots, about

10% Immedial Black NF	}	of the weight of the goods
10% sodium sulphide crystals		
5% glue		
1% soda ash		

are required. If the baths have been left standing unused for some time, it is necessary in the first place to add a little sodium sulphide (4—8 oz per 10 gallons), boiling up well afterwards and allowing to cool again before adding the afore-mentioned quantities of dyestuff and salt. Heavy goods are to advantage dyed by giving them about 6 passages in the jigger, and, after squeezing them off lightly, rinsing them in a second jigger as afore-mentioned.

The *mercerising* is best done with the goods full-width with as cold caustic soda lye as possible of 32—40° Tw., whereupon the goods are *immediately* rinsed in cold water or neutralised with acid.

If there are no suitable arrangements for the purpose, the *mercerising* may be carried out without tentering, by working the previously degummed goods for about ten minutes in a *cold* caustic soda lye of 18—20° Tw. The treatment may be effected on the winch, but is done to better advantage by means of a few passages in the jigger or padding machine. The lye is removed as well as possible by either pressing or whizzing, the goods being then neutralised immediately in a sufficiently strong hydrochloric acid bath. The goods are then rinsed thoroughly, and dyed. The material will hardly shrink by such treatment.

The following brands may also be used in addition to Immedial Black NF:

Immedial Black NG, NR, NRT, NN conc.,  
 NNG conc., NLN conc., NNR conc.  
 Immedial Carbon B, R, IIIJ.

*Fancy shades* are produced in the same way as blacks; they are likewise dyed to advantage on mercerised material, the following dyestuffs being used:

Immedial Brown B, *BR,	*Immedial Orange C
W conc., RR	Immedial Prune S
Immedial Dark Brown A	*Immedial Yellow Olive G
Immedial Dark Brown	*Immedial Yellow D
D conc.	*Immedial Dark Green B
*Immedial Cutch O, G, R,	Immedial Olive B, 3G
BG, BGG	*Immedial Green Blue CV
*Immedial Maroon B conc.	Immedial Indogene B conc.
*Immedial Bordeaux G conc.	Immedial Direct Blue
*Immedial Red Brown 3R	B, R, OD.
Immedial Bronze A	

Those marked with an asterisk (\*) tint silk slightly and are therefore best suited for coloured silk effects.

Coloured effects on silk may be produced by topping fancy colours as well as blacks with acid dyestuffs (see page 370). The silk may however also be dyed previously in an acid bath, the cotton being subsequently covered with Immedial Colours. For this purpose the following acid-dyeing dyestuffs are very well suited. For

Yellow:	Milling Yellow O, Diamine Yellow CP,
Red:	Milling Red G, Diamine Scarlet B, 3B,
Violet:	Formyl Violet S4B,
Blue:	Brilliant Milling Blue B, Victoria Blue B, Alkaline Blue,
Green:	Brilliant Milling Green B.

Dye boiling hot in an acetic or sulphuric acid bath, rinse thoroughly, and top with suitable Immedial Colours; after dyeing, brighten in a weak acetic acid bath. When using Immedial Black, some acetate or formate of soda should be added.



## APPENDIX:

Water and the Ordinary Chemicals  
Thermometer and Hydrometer Tables  
Weights and Measures.

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# WATER AND THE ORDINARY CHEMICALS.

## WATER.

Water is one of the most important requirements in dyeing, and the results obtained are often entirely dependent on the condition and quality of the water used. It is most important therefore to see that the water used for dyeing is of good quality. The purer it is, that is to say, the less foreign matter it contains, the better it is adapted for dyeing purposes, and the more completely the dyestuffs and other ingredients of the bath are utilised.

A very pure quality of water is condensed water which in most dyeworks can be collected free from oil, and is excellently adapted for dyeing purposes, chiefly for dissolving the dyestuffs and charging the dyeing machines. Rain water may likewise be used to good advantage, and can easily be collected free from mechanical impurities. Water from ponds, provided it is free from mud, is very serviceable. Other waters, in the natural state, always contain more or less impurities dissolved, and frequently also mechanical impurities.

The impurities which are the most troublesome to the dyer are the sulphates and bicarbonates of lime and magnesia, sometimes also magnesium chloride, which, together with the iron compounds, cause the hardness of the water; the iron compounds are most obnoxious in bleaching. The impurities dissolved in the water have a deleterious effect in so far as they often precipitate dyestuffs, soaps, oils and mordants, and are thus apt to cause spots and other irregularities, not to mention the loss of dyestuff, soap, etc.

Iron, apart from its property to form brown precipitates, has the disadvantage of dulling the shades. This may also be said of mud, which soils the goods mechanically.

Water free from lime, magnesium or iron salts, or which contains slight quantities of these only, for instance condense water or rain water, is called soft water in contradistinction to hard water. The hardness of the water is expressed in degrees, and varies in the different countries.

1 English degree of hardness is equivalent to

1 part of calcium carbonate in 70 000 parts of water  
or 1 grain of calcium carbonate ( $\text{Ca CO}_3$ ) per gallon of water;

1 German degree of hardness is equivalent to

1 part of calcium oxide ( $\text{Ca O}$ ) in 100 000 parts of water;

1 French degree of hardness is equivalent to

1 part of calcium carbonate ( $\text{Ca CO}_3$ ) in 100 000 parts of water.

1° English corresponds therefore to 0.8° German or 1.43° French.

Hard water on boiling loses its hardness by separating the bicarbonates in the form of carbonates. This hardness is usually called *temporary hardness*, whereas the hardness not removed by boiling is called *permanent hardness*; the sum of the two is called the *total hardness*.

Whether the water is to be considered good or bad is dependent upon the use to which it is put, but at any rate no water should be used for dyeing which exceeds 23—25° (Engl.) in hardness. Water harder than this is unsuitable particularly for machine-dyeing or for soaping or oiling.

If hard water only be available, it is well to soften it. For large daily consumption this is best done by means of one of the water-purifiers constructed by the different machine-works in which the water is softened and purified by a constant inflow of lime and soda. Of late too, water is corrected by the Permutite process.

If so desired we shall be pleased to give particulars for correcting the water in any special case.

At small establishments the purification may be done in large wooden vessels. For every degree of permanent hardness, about  $2\frac{1}{2}$  oz soda ash are added to 1000 gallons of the water to be corrected; thus, with for instance a permanent hardness of 20°, about 3 lbs soda ash should be added for 1000 gallons. After boiling up well, the

water is left standing for a few hours, to allow the precipitate to settle, whereupon the clear water freed from the precipitate is used. It is best to work with two vats, the size of which depends upon the daily requirement; the precipitate of the boiled water thus may settle in the one vat, while the soft water in the other is being used. It is best to use only as much soda as will cause as slight an alkaline reaction as possible (red litmus paper should not become strongly blued, or only a small amount of acetic acid should be required for producing an acid reaction on blue litmus paper).

Any excess of soda present in the water should be neutralised by slightly acidifying with acetic acid until blue litmus paper just begins to be reddened.

Water containing solid substances should best flow — before softening — through a pool or pond in which the greater portion of the mud collects at the bottom, the remainder settling along with the lime precipitate, on softening.

## SULPHURIC ACID.

Sulphuric acid is a thick, oily liquid without any colour (rendered brownish sometimes through the presence of small amounts of organic substances).

For dyeing, the ordinary commercial sulphuric acid, so-called oil of vitriol or D.O.V. is commonly used, which should contain 93—98% pure sulphuric acid.

Fuming sulphuric acid contains sulphuric acid anhydride, and is no longer used in dye-houses.

Sulphuric acid absorbs water from the air with great avidity, and should therefore be kept in closed vessels. On mixing with water it evolves great heat. In order to avoid dangerous boiling up and spattering, sulphuric acid should always be diluted by being poured in a thin jet into a large quantity of cold water, stirring well all the time; the water should not be hot, nor should water ever be added to undiluted acid. Sulphuric acid diluted with one-half its weight of water does not become heated again severely by the addition of cold water.

Sulphuric acid is used to the widest extent in wool and silk dyeing, particularly in the dyeing of Acid Colours and Chrome Colours. In many instances it is used in the form of bisulphate of soda, 1 part of sulphuric acid corresponding to  $2\frac{1}{2}$  parts of bisulphate of soda. For dyeing bright scarlet shades, sulphuric acid is given the preference over the technical bisulphate of soda owing to its greater purity, the shades obtained with sulphuric acid being clearer.

Somewhat larger quantities of Glauber's salt have to be added when dyeing with sulphuric acid than with bisulphate of soda, because the latter, which is to be regarded as a combination of sulphuric acid and Glauber's salt, generates Glauber's salt in the dyeing.

The strength of sulphuric acid may be determined with the hydrometer according to the following table:

## SPECIFIC GRAVITY AT 15° C. (59° F.)

(Lunge and Isler).

Degrees Twaddle	Per cent sul- phuric acid	Degrees Twaddle	Per cent sul- phuric acid	Degrees Twaddle	Per cent sul- phuric acid	Degrees Twaddle	Per cent sul- phuric acid
2	1.57	48	32.28	94	56.90	140	* 77.17
4	3.03	50	33.43	96	57.83	142	78.04
6	4.49	52	34.57	98	58.74	144	78.92
8	5.96	54	35.71	100	59.70	146	79.80
10	7.37	56	36.87	102	60.65	148	80.68
12	8.77	58	38.03	104	61.59	150	81.56
14	10.19	60	39.19	106	62.53	152	82.44
16	11.60	62	40.35	108	63.43	154	83.32
18	12.99	64	41.50	110	64.26	156	84.50
20	14.35	66	42.66	112	65.08	158	85.70
22	15.71	68	43.74	114	65.90	160	86.90
24	17.01	70	44.82	116	66.71	162	88.30
26	18.31	72	45.88	118	67.59	164	90.05
28	19.61	74	46.94	120	68.51	165	91.00
30	20.91	76	48.00	122	69.43	166	92.10
32	22.19	78	49.06	124	70.32	167	93.43
34	23.47	80	50.11	126	71.16	168	95.60
36	24.76	82	51.15	128	71.99	168.3*	97.70
38	26.04	84	52.15	130	72.82	168.1*	98.70
40	27.32	86	53.11	132	73.64	168*	99.20
42	28.58	88	54.07	134	74.51	167.7*	99.95
44	29.84	90	55.03	136	75.42		
46	31.11	92	55.97	138	76.30		

\* Sulphuric acid of 97.70% has the highest specific gravity, whilst that of stronger acid is a little lower.

## HYDROCHLORIC ACID.

Hydrochloric or muriatic acid appears in commerce as a liquid either colourless or coloured greenish-yellow by traces of iron. The commercial acid usually has a specific gravity of 26—38° Tw., and is contaminated with iron, arsenic, sulphuric acid and organic substances; for dyeing it is usually sufficiently pure.

Hydrochloric acid forms a freely soluble lime-salt (calcium chloride) and is therefore to be preferred to sulphuric acid for removing lime salts by souring off.

In dyeing, hydrochloric acid is used for various purposes, e. g. for preparing the diazotising baths.

The strength of hydrochloric acid may be determined by twaddling according to the following table.

## SPECIFIC GRAVITY AT 15° C. (59° F.)

(Lunge and Marchlewski).

Degrees Twaddle	Per cent hydrochloric acid	Degrees Twaddle	Per cent hydrochloric acid	Degrees Twaddle	Per cent hydrochloric acid	Degrees Twaddle	Per cent hydrochloric acid
1	1.15	11	11.18	21	20.97	31	30.55
2	2.14	12	12.19	22	21.92	32	31.52
3	3.12	13	13.19	23	22.86	33	32.49
4	4.13	14	14.17	24	23.82	34	33.46
5	5.15	15	15.16	25	24.78	35	34.42
6	6.15	16	16.15	26	25.75	36	35.39
7	7.15	17	17.13	27	26.70	37	36.31
8	8.16	18	18.11	28	27.66	38	37.23
9	9.16	19	19.06	29	28.61	39	38.16
10	10.17	20	20.01	30	29.57	40	39.11

It will be noticed that each degree Twaddle indicates approximately 1 percent pure hydrochloric acid.

## ACETIC ACID.

Acetic acid is obtained by the dry distillation of wood. The pure concentrated product solidifies at ordinary temperature forming crystals of ice-like appearance, and is therefore called *glacial acetic acid*. Owing to its high price, it is not used for dyeing purposes.

Commercial acetic acid is a colourless liquid usually containing 30—50% pure acetic acid. It generally contains

from its preparation empyreumatic substances, and traces of mineral acids, or it may be adulterated by mineral acids. An admixture of the latter is liable to be especially injurious in acetic acid used for brightening or scrooping cotton goods, as the mineral acids are apt to tender the cotton on storing. For such purposes, only acetic acid warranted free from mineral acids should be used, whilst for most other purposes a slight admixture of mineral acids is of no consequence.

Acetic acid is used in dyeing for acidifying the liquors for dyeing, mordanting and aftertreating, particularly also when dyeing in weakly acid baths in order to cause the Basic Colours to dye more slowly and evenly, especially when the sulphuric acid would act too quickly and sharply. Acetic acid is also used largely for brightening silk.

The hydrometer, while insufficient for determining exactly the strength of acetic acid, is used for approximately estimating its concentration.

SPECIFIC GRAVITY OF ACETIC ACID AT 15° C. (59° F.)  
(Oudemans).

Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle
5	1.3	25	7.0	45	11.4	65	14.3	85	14.8
10	2.8	30	8.2	50	12.3	70	14.7	90	14.3
15	4.3	35	9.4	55	13.1	75	14.9	95	13.2
20	5.7	40	10.5	60	13.7	80	15.0	100	11.1

The specific gravities above 11° Tw. correspond to two liquids of different strengths. To ascertain whether the acid contains more or less than 77% pure acetic acid, a small quantity of water should be added after measuring; if, on again measuring, a higher specific gravity is found, the acid contains more than 77%, otherwise less.

## FORMIC ACID.

Pure formic acid is a colourless liquid with a boiling point of 100.8° C. (213½° F.), which freezes to a crystalline mass melting at 8.6° C. (47½° F.). Its specific gravity at 15° C. (59° F.) is 1.256.

Formic acid as a rule is sold in a very pure state, chiefly in strengths of 85% and 98—100% pure acid.

When dyeing with Acid Colours, Chrome Colours etc., formic acid behaves very similarly to acetic acid, but is more than twice as efficacious as the latter with the same percentages. (Formic acid of 85%, as usually sold, may be considered as being about five times as efficacious as the 30% acetic acid). Formic acid also resembles acetic acid in that it does not impair the vegetable fibre.

Formic acid, if its higher price does not stand in the way, serves as a very good substitute for sulphuric acid, particularly in union dyeing, equal parts of concentrated formic and sulphuric acid nearly corresponding with each other.

Formic acid is also used very largely as a substitute for tartar in mordanting with chrome.

In silk dyeing, formic acid is used as a substitute for acetic acid both for dyeing and brightening.

**SPECIFIC GRAVITY OF FORMIC ACID AT 20° C. (68° F.)**  
(Richardson and Allaire).

Perc. by Weight	Perc. by Volume	Specific Gravity	Perc. by Weight	Perc. by Volume	Specific Gravity	Perc. by Weight	Perc. by Volume	Specific Gravity
Formic acid			Formic acid			Formic acid		
5	4.14	1.0116	40	35.90	1.0964	75	72.27	1.1770
10	8.40	1.0247	45	40.82	1.1086	80	77.67	1.1861
15	12.80	1.0371	50	45.88	1.1208	85	83.19	1.1954
20	17.17	1.0489	55	51.01	1.1321	90	88.74	1.2045
25	21.23	1.0610	60	56.13	1.1425	95	94.48	1.2141
30	26.37	1.0730	65	61.44	1.1544	100	100	1.2213
35	31.10	1.0848	70	66.80	1.1656			

**LACTIC ACID.**

Commercial lactic acid represents a pure yellow to brown syrup containing 50, and sometimes 80 percent of pure lactic acid, contaminated by sulphuric acid, sugar, dextrine, iron and other substances. In water, lactic acid is soluble in any proportion.

On account of its stronger reducing properties, lactic acid is frequently used as a substitute for tartar and for oxalic acid when dyeing on a chrome mordant, for which purpose the acid salts of lactic acid, known as lactoline, are also used. In silk dyeing, lactic acid is used as a brightening agent.



**OXALIC ACID.**

Oxalic acid forms colourless crystals which at ordinary temperature dissolve in about eight times their weight of water, and at a higher temperature exceedingly readily in water. Oxalic acid and its salts are poisonous.

Commercial oxalic acid is chemically almost entirely pure. Oxalic acid is a strong acid, and behaves in dyeing on the whole similarly to sulphuric acid, on which account it is used largely for fixing Acid Colours, particularly in wool printing. It further possesses good reducing properties, and is therefore frequently employed as a substitute for tartar when mordanting with chrome.

Owing to its property to form a lime-salt completely insoluble in water and acetic acid, it is applied also in some other cases, for instance in the dyeing of Naphtyl Blue Black, with the addition of copper sulphate (see pages 9 and 130); in this case it cannot be substituted by sulphuric acid, as the latter prevents the copper from going on to the fibre.

**TARTARIC ACID.**

Tartaric acid is marketed in the shape of large, colourless crystals which are very readily soluble in water, but less easily in alcohol. 100 parts water dissolve 115 parts tartaric acid at 0° C. (32° F.) and 140 parts at 20° C. (68° F.). It is used largely in wool printing for fixing Acid Colours, and in silk dyeing for brightening the silk.

**OLEIC ACID OR OLEINE.**

Crude oleic acid or so-called oleine is a by-product in the production of stearic acid, and forms an oil of a melting point of 14° C. (57° F.) insoluble in water. Its alkaline salts are readily soluble in water, its other salts however are insoluble.

Oleine is used in considerable quantities for greasing wool and in the preparation of soap, as well as in the washing and milling of wool, and for other dyeing purposes. For the production of a neutral soap, about 48 parts of good potash or 38 parts of soda ash are required for 100 parts oleine.

**CAUSTIC SODA, SODIUM HYDROXIDE  
OR SODIUM HYDRATE; CAUSTIC SODA LYE.**

Caustic soda, known scientifically as "sodium hydroxide", is marketed as a white molten mass in iron drums. It very readily dissolves in water and is deliques-



cent in the air, the resulting solution by absorbing carbon dioxide soon forming a hard mass of sodium carbonate. It has a very strong caustic effect and taste.

The usual market qualities contain 77—97% pure sodium hydroxide.

Caustic soda lye is an aqueous solution of caustic soda, and is bought for preference ready made in the case of favourable conditions of freight and transport, because the dissolving of caustic soda is very inconvenient.

Caustic soda lye, like sodium hydroxide, has a very strong caustic action. It should be particularly borne in mind that the smallest drop of even very dilute caustic soda lye is of grave danger for the eye.

**SPECIFIC GRAVITY OF CAUSTIC SODA LYE AT 15° C. (59° F.)**  
(Lunge).

Per cent Sodium Hydroxide	Degrees Twaddle	Per cent Sodium Hydroxide	Degrees Twaddle	Per cent Sodium Hydroxide	Degrees Twaddle
1	2.4	21	47.2	41	89.4
2	4.6	22	49.4	42	91.5
3	7.0	23	51.6	43	93.6
4	9.2	24	53.8	44	95.6
5	11.8	25	55.8	45	97.6
6	14.0	26	58.0	46	99.8
7	16.2	27	60.0	47	101.6
8	18.4	28	62.0	48	103.8
9	20.6	29	64.2	49	105.8
10	23.0	30	66.4	50	108.0
11	25.2	31	68.6	51	110.0
12	27.4	32	70.2	52	112.0
13	29.6	33	72.6	53	114.0
14	31.8	34	74.8	54	116.0
15	34.0	35	76.8	55	118.2
16	36.2	36	79.0	56	120.2
17	38.4	37	81.0	57	122.2
18	40.4	38	83.0	58	124.4
19	42.6	39	85.2	59	126.6
20	45.0	40	87.4	60	128.6

Sodium hydroxide and caustic soda lye are used in the bleaching of cotton and in the dyeing of a good many colours, for instance, of Hydron Colours, and in the

dissolving of certain developers. They are very important also for the mercerising of cotton and the preparation of soap.

The strength of caustic soda lye is determined by means of the hydrometer at hand of the table given on the previous page. It has to be observed that the hydrometer does not indicate whether the product contains soda, common salt or Glauber's salt, and how much of each of these products. Such impurities will raise the specific gravity of the lye.

### AMMONIA (LIQUOR AMMONIAE).

Ammonia represents the aqueous solution of ammonia gas and has a very pungent smell. It is marketed mostly in a strenght of 24% (0.913 specific gravity), and is thus lighter than water.

Ammonia gas is driven out of the solution by heat, and escapes into the air by itself. The gas is sold in a condensed form in steel cylinders as a chemically almost pure liquid.

Ammonia has a strongly alkaline effect, and blues red litmus paper; it neutralises all acids and forms salts therewith. Its effect is milder than that of caustic soda iye, and it offers the great advantage that any excess easily volatilises, and consequently has no deleterious effect in many cases.

Ammonia is used in wool washing, for neutralising acids, for fixing mordants and for other purposes.

Its strength is usually determined by twaddling in accordance with the table given below.

**SPECIFIC GRAVITY OF AMMONIA AT 15° C. (59 deg. F.)**  
(Lunge and Wiernik).

Specific gravity at 59° F.	Per cent (gaseous) ammonia	Specific gravity at 59° F.	Per cent (gaseous) ammonia	Specific gravity at 59° F.	Per cent (gaseous) ammonia
1.000	0.00	0.960	9.91	0.920	21.75
0.995	1.15	0.955	11.34	0.915	23.36
0.990	2.31	0.950	12.74	0.910	24.99
0.985	3.55	0.945	14.22	0.905	26.65
0.980	4.80	0.940	15.63	0.900	28.33
0.975	6.05	0.935	17.12	0.895	30.03
0.970	7.31	0.930	18.64	0.890	31.75
0.965	8.59	0.925	20.18	0.885	33.68

## SODIUM SULPHIDE.

Sodium Sulphide is marketed in two qualities, viz, as *crystallised* and as *concentrated* sodium sulphide. Crystallised sodium sulphide consists of brownish crystals containing  $32\frac{1}{2}\%$  pure sodium sulphide and in addition water of crystallisation. The concentrated product has usually double the strength, and is sold in the form of grey or greyish black, irregular lumps.

Sodium sulphide dissolves readily in cold or warm water. It absorbs moisture, carbon dioxide and oxygen from the air liquefies and becomes partially converted into carbonate and sulphate of soda. As it thereby loses correspondingly in strength, it should be stored if possible in well closed receptacles and should not be kept too long in stock.

Sodium sulphide is used for dissolving Sulphide Colours, and is applied as described above.

## SODA OR SODA ASH, SODIUM CARBONATE OR CARBONATE OF SODA.

Soda is usually sold as a white powder (soda ash, Solvay or ammonia soda) or in the form of crystals (soda crystals, crystal carbonate). It is produced principally according to the older Leblanc process or the newer Solvay or ammonia process, and nowadays also by electrolysis. Before the introduction of the Solvay process, Leblanc soda was often very impure, whereas Solvay soda apart from common salt cannot contain any soluble impurities over from the manufacture. Ammonia soda is therefore frequently preferred, but Leblanc soda has likewise been manufactured for years past already in excellent purity.

*Soda crystals* is crystallised soda containing about 63% crystal water and small amounts of Glauber's salt, but no deleterious impurities. It contains mostly about 36% pure sodium carbonate. Since soda ash of good quality is obtainable, soda crystals is not used much nowadays in dye-houses, as it is too expensive comparatively; the only advantages it possesses over good soda ash is that its strength is nearly always the same and that it dissolves quickly in water without forming lumps.

*Crystal carbonate* is likewise a pure crystallised soda, containing however 18% water of crystallisation only.

Soda is stable on exposure to the air; soda ash is apt to form hard lumps in moist air, without absorbing any appreciable quantities of water. It has a caustic taste

and a milder alkaline effect than caustic soda. Most acids like sulphuric, hydrochloric and acetic acid neutralise soda with development of carbon dioxide; its solutions therefore effervesce on adding acids.

Soda dissolves most copiously in water of 32.5° C. (90½° F.) 100 parts of water dissolve the following quantities of pure sodium carbonate at:

32	41	50	59	68	86	90½	93 and 174	212° F.
7.1	9.5	12.6	16.5	21.4	38.1	59	46.2	45.1 parts soda.

Soda ash is marketed in various degrees of strength, calculated on the supposed percentages of sodium oxide. Good qualities of soda ash contain 81%, 88—95% and 98%. Ammonia soda usually contains 98—99% sodium carbonate, and is sufficiently pure for all dyeing purposes.

Our indications regarding *soda ash* refer to the good qualities (95—98%), of whatever manufacture they may be. 100 parts of good soda ash are approximately equivalent to 270 parts soda crystals.

The strength of pure soda solutions may be determined with the hydrometer at hand of the following table. It has however to be observed that impurities like salt, Glauber's salt and sodium sulphide are not especially indicated.

In the dyeing industry, soda is used particularly for neutralising acids, chiefly after carbonising, and also for dyeing with Alkaline Blue, in washing wool and preparing soap.

SPECIFIC GRAVITY OF SODA SOLUTION 15° C. (59° F.)  
(L u n g e).

Degrees Twaddle	Per cent Sodium Carbonate	Degrees Twaddle	Per cent Sodium Carbonate	Degrees Twaddle	Per cent Sodium Carbonate
1	0.47	11	5.23	21	9.90
2	0.95	12	5.71	22	10.37
3	1.42	13	6.17	23	10.83
4	1.90	14	6.64	24	11.30
5	2.38	15	7.10	25	11.76
6	2.85	16	7.57	26	12.23
7	3.33	17	8.04	27	12.70
8	3.80	18	8.51	28	13.16
9	4.28	19	8.97	29	13.63
10	4.76	20	9.43	30	14.09

# COMMON SALT, SODIUM CHLORIDE (ROCK SALT).

Common salt is made from rock-salt, salt water, sea-water etc. It crystallises without water of crystallisation, but ordinarily contains some moisture, and frequently also some sodium sulphate, calcium sulphate or magnesium chloride. The solubility of common salt is about the same at any temperature, and varies only between 35.5 parts common salt at 0° C. (32° F.) up to 39.2 parts at 100° C. (212° F.), in 100 parts of water. The specific gravity of aqueous solutions at 15° C. (59° F.) according to Gerlach is as follows:

Per cent common salt	5	10	15	20	25	26.4 saturated.
Specific gravity	1.0362	1.0733	1.1114	1.1510	1.1923	1.2043
Degrees Twaddle	7.2	14.7	22.3	30.2	38.5	40.9

## GLAUBER'S SALT, SODIUM SULPHATE OR SULPHATE OF SODA.

Glauber's salt is used as Glauber's salt crystals or as desiccated Glauber's salt (sodium sulphate). The desiccated product may contain various impurities, especially an excess of sulphuric acid. The crystallised salt is generally of a fairly pure quality, and, if chemically pure, contains 44.1% anhydrous salt and 55.9% water. It effloresces in the air and is easily soluble in water. 100 parts desiccated Glauber's salt are equivalent to about 220 parts Glauber's salt crystals.

100 parts of water dissolve at:

32°	50°	59°	68°	77°	86°	91½°	104°	217½° F.
5	9	13	19	28	40	50	49	42.6 parts of desiccated Glauber's salt.

For cotton, Glauber's salt is used in the dyeing of Diamine and Immedial Colours.

In machine-dyeing, special care must be taken that the Glauber's salt used is readily soluble, on which account Glauber's salt crystals should be here given the preference.

Glauber's salt is further used in the dyeing of wool, half-wool and half-silk, but not so much for silk dyeing, and is generally applied in the form of crystals. It is chiefly used for the dyeing of Acid Colours, Chrome Colours and Diamine Colours in order to retard the absorption of the dyestuff by the fibre and thus facilitate the production of good level shades.

A slight excess of acid contained in the Glauber's salt does not affect the dyeing of the Acid or Chrome Colours, but may cause a too rapid absorption of Diamine Colours by the wool, particularly in the dyeing of unions; the Glauber's salt used for this purpose should therefore be neutral, i. e. not redden blue litmus paper.

**SPECIFIC GRAVITY OF AQUEOUS SOLUTIONS OF DESICCATED GLAUBER'S SALT AT 15° C. (59° F.)**

Per cent desicc. Glauber's salt	Specific Gravity	Per cent desicc. Glauber's salt	Specific Gravity	Per cent desicc. Glauber's salt	Specific Gravity
1	1.0091	5	1.0457	9	1.0832
2	1.0182	6	1.0550	10	1.0927
3	1.0274	7	1.0644	11	1.1025
4	1.0365	8	1.0737	12	1.1117

saturated.

The percentages of crystallised Glauber's salt are found by multiplying the above percentages by  $2\frac{1}{4}$ .

**SODIUM BISULPHATE OR BISULPHATE OF SODA.**

A white, crystalline mass very freely soluble in water. In a dilute aqueous solution this salt gradually dissociates into neutral sodium sulphate (Glauber's salt) and free sulphuric acid, and for this reason is used in wool dyeing instead of a mixture of sulphuric acid and Glauber's salt as a slowly acting agent for gradually acidulating the dye liquor.

10 parts of sodium bisulphate are practically equivalent to a mixture of 4 parts sulphuric acid and 10 parts Glauber's salt crystals.

Bisulphate frequently containing iron as an impurity, sulphuric acid and Glauber's salt are as a rule given the preference when dyeing bright scarlet shades. For other purposes the technical bisulphate will in most cases be found sufficiently pure.

**SODIUM NITRITE OR NITRITE OF SODA. NITRITE.**

Sodium nitrite forms small crystals freely soluble, but not deliquescent in the air, and containing 95—98% nitrite.

It is used for diazotising dyestuffs to be developed, its action being based on the liberation of nitrous acid by the addition of mineral acids, such as hydrochloric or sulphuric acid; acetic acid has not the same effect. For 1 part of nitrite, 3 parts of hydrochloric acid 32° Tw. or 2 parts of sulphuric acid used.

**SODIUM ACETATE OR ACETATE OF SODA.**

This salt forms clear very readily soluble crystals which decompose but very little. It serves for neutralising free mineral acids, forming their salts and liberating free acetic acid. It is used for instance in the coupling and also in the developing of Paranitraniline Red, i. e. in the preparation of the solution of the diazotised Paranitraniline or of Nitrazol. For union goods which have been cross-dyed in an acid bath, a final impregnation with acetate of soda is very useful for preserving the strength of the cotton fibre, and an addition of acetate of soda to the last bath used for rinsing union goods dyed with Immedial Black is always advisable.

**SODIUM FORMATE OR FORMATE OF SODA**

possesses similar properties, and is used for the same purposes as acetate of soda. It is marketed in a very pure quality.

**SODIUM PHOSPHATE OR PHOSPHATE OF SODA.**

This salt forms crystals which effloresce in the air, and are soluble in 25 times their weight of cold water or in their own weight of boiling water. Phosphate of soda is used in the weighting of silk.

**BORAX, SODIUM BI-BORATE OR BI-BORATE OF SODA.**

White crystals containing water of crystallisation, or a white anhydrous powder of moderate solubility in water; feebly alkaline salt, which affects the wool but little, and is therefore frequently used in the dyeing of Alkaline Blue in order to render the bath feebly alkaline as required for this dyestuff.

**SODIUM PERBORATE OR PERBORATE OF SODA.**

Sodium perborate or perborate of soda, *perborate* for short, is a white powder very sparingly soluble in water, which contains in its pure state 10% active oxygen. More recently it is manufactured also in a crystalline form. It reacts alkaline, and on being heated easily emits oxygen, thus exercising a strong bleaching action similar to hydrogen peroxide. On this account it is recommended as a bleaching agent in substitution for hydrogen or sodium peroxide, and also as an addition to washing powders. It has the advantage over the former of excellent stability, and over the latter of safety in its application.



which is also easier, because the product is simply put into the aqueous bath without the addition of acid.

On becoming moist or when in an impure state, perborate very soon loses oxygen.

### **SODIUM SILICATE OR SILICATE OF SODA, SOLUBLE GLASS.**

Silicate of soda as a rule is marketed as a colourless or slightly tinted glassy mass or as a thick aqueous solution frequently containing an excess of caustic soda deriving from its manufacture. It is very easily soluble in water, but not deliquescent; the solution decomposes, particularly under the influence of the carbonic acid from the air, and separates silicic acid. Silicate of soda is an alkaline salt and is used for the weighting of silk and other purposes. It is largely employed for fire-proofing and water-proofing textile materials.

### **SODIUM CHLORATE OR CHLORATE OF SODA.**

Colourless crystals which dissolve in their own weight of cold water or half their weight of hot water, thus dissolving much more easily than the corresponding potassium salt. On the whole the two salts possess the same properties. Sodium chlorate is a strong oxidising agent. It is frequently added to dark print pastes, particularly to Blacks (in quantities of 5—20 parts per 1000 parts) in order to prevent the pastes from running when the steam is pretty damp. Through inflammable bodies or by the action of concussion or heat, the chlorates might explode, and they should therefore be stored with great care, best by themselves.

### **SODIUM BISULPHITE OR BISULPHITE OF SODA.**

This product is usually marketed under the denomination of metasulphite or pyrosulphite, in the form of white crystals which decompose with the evolution of heat on exposure to the air.

In the dye-house the aqueous solution of sodium bisulphite is used almost exclusively, which is either colourless or stained slightly yellowish by traces of iron and smelling of sulphurous acid, generally containing 22—23% sulphurous acid and showing a specific gravity of about 64° Tw. Bisulphite is used in large quantities for the bleaching of wool and for preparing hydrosulphite solution. It is sometimes also used in order to remove hypochlorous acid from the bleached materials.



## HYDROSULPHITE CONC. POWDER. SODIUM HYDROSULPHITE OR HYDROSULPHITE OF SODA.

Sodium hydrosulphite, which we deliver as *Hydrosulphite conc. powder*, keeps well in the solid state (contrary to its solution) if protected against moisture. In moist air, and particularly in aqueous solution, it is very apt to oxidise, and it should therefore be kept dry in a closed receptacle. It dissolves very easily in water. Solutions should not be kept on stock, but should be prepared for each case immediately before use.

Hydrosulphite is a very powerful reducing agent and is used chiefly for dissolving and dyeing Hydron Colours. As it has a destructive effect on a good many colours, it may be used also for stripping the colour off dyed materials.

For this purpose the solution may be prepared for direct use by pouring a solution of

10 gallons bisulphite 62° Tw. and  
10 gallons cold water over  
10 lbs zinc-dust,

stirring for a short time, allowing to settle, and using the clear solution, if necessary, filtered. For every 100 gallons water, 4—6 gallons hydrosulphite and  $\frac{1}{2}$  gallon acetic acid are added; enter the goods, heat to 50—60° C. (120—140° F.), and work for  $\frac{1}{4}$  to  $\frac{1}{2}$  hour until the colour is light enough; then rinse well.

## SODIUM THIOSULPHATE, HYPOSULPHITE OF SODA, ANTICHLOR.

Sodium thiosulphate is a very easily soluble, well crystallising salt; it decomposes separating sulphur and sulphurous acid, and is therefore used for mordanting wool with sulphur before dyeing with Solid Green or Brilliant Green (see page 18).

## POTASH, POTASSIUM CARBONATE, CARBONATE OF POTASH.

Potash is produced from wood ash or chlorate of potash, and forms a white mass absorbing water from the air, and very deliquescent. Apart from its great solubility and deliquescence, it is very similar to soda in its behaviour.

Potash soaps are milder than soda soaps, and are therefore frequently given the preference for washing and milling the undyed wool. Mild soaps for washing and milling wool are frequently prepared from oleïne (crude oleïc acid) and potash (see page 386).

### **TARTAR, CREAM OF TARTAR, POTASSIUM BITARTRATE, OR BITARTRATE OF POTASH, ARGOL.**

Tartar is the acid potassium salt of tartaric acid, and is produced by refining the sediment resulting from the fermentation of wine. In its natural state the substance is known as argol (red or white, according to the colour).

Tartar is very sparingly soluble in cold water, and even at 100° C. (212° F.) 100 parts water dissolve no more than 6.9 parts tartar.

Tartar is used as an assistant in chrome mordanting, as it causes the bichrome to go better on to the fibre, and by reduction brings it at the same time into a form suitable for fixing the dyestuffs.

Of late, lactic acid, lactoline, formic acid, oxalic acid, lignorosine and other substances have been frequently used with much success.

### **AMMONIUM ACETATE OR ACETATE OF AMMONIA.**

Crystals which are exceedingly soluble in water and deliquescent in the air. The solution of the salt smells of ammonia, and turns red litmus paper faintly blue. The solution is sold in the market, but may easily be prepared by mixing

10 oz ammonia (0.913 sp.g. or 24%) and  
28¼ oz acetic acid (8° Tw. or 30%).

The solution should not materially change either blue or red litmus paper.

Acetate of ammonia serves for mildly acidulating the dyebaths of Alphanol Blue, Diamine Colours, etc., and for stripping colours off wool and silk.

### **AMMONIUM OXALATE OR OXALATE OF AMMONIA.**

Ammonium oxalate is a well crystallised salt which dissolves readily at 15° C. (59° F.) in 24 times its weight of water. The solution of the salt may be prepared by dissolving

1 lb oxalic acid in  
1 gallon hot water and neutralising the solution  
with about  
1½ lbs ammonia (0.913 sp.g. or 24%);

this solution should not change either blue or red litmus paper, and contains about  $1\frac{1}{8}$  lbs oxalate of ammonia (cryst.).

The salt is used principally in the dyeing of some Chrome Colours, in order to precipitate the lime salts contained in hard water, thus rendering the water innocuous.

### AMMONIUM SULPHOCYANIDE.

This salt forms colourless, very freely soluble leaflets. It is chiefly applied in wool dyeing in order to reduce the effect of metallic copper on certain dyestuffs, by forming a sort of coating of sulphocyanide of copper, which protects the copper. Care should therefore be taken, if possible, not to remove this coating when cleaning copper vessels by polishing them.

### MAGNESIUM CHLORIDE.

Very easily soluble and deliquescent crystals which decompose on heating in the presence of moisture, generating hydrochloric acid. It is used as an addition to cotton dressings and sizings to protect the goods from becoming mouldy, and for weighting. In hot finishing on the calender, magnesium chloride, as indicated above, is likely to generate hydrochloric acid and thus affect the vegetable fibre; on this account, magnesium chloride is not always safe to use and is sometimes replaced by calcium chloride or Epsom salts.

### EPSOM SALT, MAGNESIUM SULPHATE OR SULPHATE OF MAGNESIA.

Epsom salt is an easily soluble salt which is marketed in the form of crystals or of a crystalline powder. It is sometimes used as an addition for sizing, when magnesium chloride, on account of the risk of tendering the fibre, cannot be used (see *magnesium chloride*); it must therefore be free from any magnesium chloride.

### CALCIUM CHLORIDE.

This is a very easily soluble salt which is formed by the action of hydrochloric acid on lime and chalk and is obtained as a waste product in many chemical processes. It is sometimes used as a substitute for magnesium chloride in finishing, because it does not separate any hydrochloric acid at an elevated temperature.

**ALUM.**

Commercial alum is sold either as potash alum or as ammonia alum, which show practically no difference in their properties.

The solubility of alum is shown in the following table.

100 parts of water dissolve at:

50°	68°	86°	104°	158°	212° F.	
9.5	15.1	22.0	30.9	90.7	357.5	parts potash alum
9.1	13.6	19.3	27.3	72.0	421.9	parts ammonia alum.

Alum is used in wool dyeing for mordanting and for increasing the fastness to water of dyed shades and also for water-proofing; it is moreover employed as a weakly acid salt in the place of free acids, particularly in wool-printing.

**ALUMINIUM SULPHATE OR SULPHATE OF ALUMINA.**

Aluminium Sulphate has the same properties as alum, but is stronger than the latter, 100 parts of aluminium sulphate being equivalent to 140—150 parts of alum; it is very easily soluble in water. Aluminium sulphate sometimes contains an excess of sulphuric acid or small amounts of oxide of iron and Glauber's salt; it usually contains 50% pure aluminium sulphate, sometimes even more than 55%.

**ALUMINIUM ACETATE OR ACETATE OF ALUMINA.**

This is known only in form of its aqueous solution, and is usually prepared by mixing aluminium sulphate with lead acetate (sugar of lead) or calcium acetate; for instance, 171 parts sugar of lead are used per 100 parts of aluminium sulphate, the two being mixed together in aqueous solution and allowed to settle, whereupon the clear solution is drawn off for use. In order to free the solution entirely from lead, a small amount of Glauber's salt in solution may be added subsequently.

Acetate of alumina is frequently used for water-proofing. The purer the product, the stronger is its effect; on this account the solution is to best advantage prepared for this purpose with alumina hydrate and acetic acid. Acetate of alumina is employed also for fixing some of the Acid Colours in wool-printing.

**CHROME ALUM.**

Chrome alum is obtained as a waste product in various chemical manufactures; it forms dark crystals which in spite of their beautiful, crystalline form may contain a great many impurities, more particularly calcium sulphate, tarry and other organic substances, and free sulphuric acid.

1 part of chrome alum dissolves in 7 parts cold or 2 parts boiling water. Chrome alum is used sometimes for fixing Chrome Colours, Diamine Colours and Immedial Black.

**CHROMIUM FLUORIDE.**

Chromium fluoride is a green crystalline powder readily soluble in both cold and hot water, and has a corroding effect on glass and most metals.

Chromium fluoride is used chiefly in Vigoureux printing for fixing some of the Diamine Colours fast to milling. Diamine Fast Red F and Diamine Green G in particular, as well as some of the Chrome Colours. It is also used in the dyeing of a pure Yellow by means of Anthracene Yellow GG which with chromium fluoride yields clearer shades than with bichrome. It has been used sometimes in the place of bichrome as a chrome mordant, 4% chromium fluoride being used with the addition of 2% oxalic acid.

**CHROMIUM FORMATE OR FORMATE OF CHROME.**

This salt is marketed as a greyish green powder, easily soluble in double its weight of water. It is applied in Vigoureux printing for fixing Chrome and Vigoureux Colours in the place of chromium fluoride and acetate of chrome, because it preserves the soft handle and the spinning capacity of the wool particularly well.

**CHROMIUM ACETATE OR ACETATE OF CHROME**

is produced by dissolving chromium hydroxide in acetic acid or by the double decomposition of chrome alum with sugar of lead. Chromium acetate serves chiefly for fixing dyestuffs in wool printing. It is exceedingly readily soluble in water.

**POTASSIUM BICHROMATE. BICHROME. CHROME, RED CHROMATE OR BICHROMATE OF POTASH.**

Potassium bichromate crystallises in large yellowish red crystals which are stable when exposed to the air and contain no water of crystallisation. 100 parts of water dissolve at:

32°	50°	104°	176°	212° F.
5	8.5	29.1	73	102 parts bichrome.

The commercial product is practically chemically pure.

Bichrome is used for chrome mordants, as well as for fixing Chrome Colours. Diamine and Immedial Colours; it is also used for stripping colours off shoddy goods.

### SODIUM BICHRIMATE OR BICHRIMATE OF SODA. BICHROME. CHROME.

Sodium bichromate, contrary to potassium bichromate, forms deliquescent crystals containing water of crystallisation, and is more easily soluble and cheaper than the potassium salt, for which reason it is frequently used in place of the latter.

It is usually marketed in a strength equal to that of potassium bichromate, but not always of the same purity.

100 parts of water dissolve at:

32°	50°	86°	176°	212° F.
107	109	127	143	163 parts sodium bichromate.

Sodium bichromate is applied in exactly the same manner as potassium bichromate. and has the same effect.

### COPPERAS OR GREEN VITRIOL. FERROUS SULPHATE.

Copperas is obtained by dissolving iron in diluted sulphuric acid, and on large scale from iron pyrites. It forms bluish green crystals which easily decompose when exposed to the air, and become brownish by oxidation. It is easily soluble in water, but quickly oxidises on exposure to the air, separating red ferric hydrate.

Copperas is used in wool dyeing, chiefly as a mordant and fixing agent for logwood and logwood combinations with Naphtylamine Blue Black and Naphtylamine Black, also for the combination of Naphtyl Blue Black with sumac (see page 130); for these purposes it is as a rule applied together with copper sulphate. It further serves for the weighting of silk.

### PYROLIGNITE OF IRON, IRON LIQUOR OR BLACK LIQUOR.

This is a dark olive brown liquid with a peculiar smell. The commercial product usually has a specific gravity of 20—31° Tw. It is sometimes used for the weighting of silk.

**NITRATE OF IRON. BASIC FERRIC SULPHATE.**

Nitrate of iron derives its name from being prepared by the oxydation of ferrous sulphate by means of nitric acid. It is however not a nitrate but a sulphate, and is marketed as an aqueous solution of about 80° Tw. It is used very largely as a mordanting and weighting agent for black silk.

**COPPER SULPHATE. CUPRIC SULPHATE**  
**or SULPHATE OF COPPER. BLUESTONE or BLUE**  
**VITRIOL.**

Bluestone forms blue transparent crystals soluble in water.

100 parts of water dissolve at:

50°	68°	86°	122°	158°	194°	212° F.
37	42	49	66	95	156	203 parts of blue vitriol.

Sulphate of copper is used in wool-dyeing for increasing the fastness to steaming and perspiration of some dyestuffs, such for instance as Naphtyl Blue Black (all brands), Naphtylamine Black R, RNB, NBB, Alphanol Black and Alphanol Blue, as well as for increasing the fastness to light of some Diamine and Immedial Colours, and for fixing wood colours, in the latter case mostly in combination with copperas (see for instance page 130 et seq.).

**TIN CRYSTALS OR TIN SALT. STANNOUS CHLORIDE.**

This salt is prepared by dissolving tin in hot hydrochloric acid. It dissolves completely in one-third its weight of water; the pure solution is rendered turbid when being diluted, through the separation of salt, but on adding hydrochloric acid it becomes clear again.

Tin crystals are still used occasionally as a discharging agent.

**TETRACHLORIDE OF TIN. PERCHLORIDE OF TIN.**

This is used in the form of very pure crystalline salt or of solutions, or else in the form of double salt together with ammonium chloride as "pink salt". It is exceedingly easily soluble in water, and is used largely for the weighting of silk, and further as a substitute for tartar emetic.

**TARTAR EMETIC.**

*Tartar emetic, the double tartrate of antimony and potassium,* is a crystalline salt not very soluble in cold



water, but more so in hot water. One part of tartar emetic requires for dissolving at

48°	70°	88°	122°	167° F.
19	12.6	8.2	5.5	3.2

parts of water.

Tartar emetic is used for fixing tannic acid for various purposes, and more particularly in the dyeing of Basic Colours on cotton.

The corresponding *sodium salt of tartar emetic*, on account of its much greater solubility, is given the preference for printing purposes.

The effective substance of tartar emetic is the antimony oxide, of which 43.4% are contained in the pure salt. The commercial product consists either of fine crystals or irregular pieces containing 43% antimony oxide; tartar emetic, adulterated with cheaper antimony salts or entirely valueless substances, is also frequently met with in the market.

Tartar emetic and the other antimony salts are poisonous, but there is no risk of poisoning if the goods are tolerably well rinsed, after mordanting, as has been proved by many years' experience.

The valuation of tartar emetic and other antimony salts is based on the amount of antimony contained, which can only be determined by an exact analysis.

*Substitutes for Tartar Emetic.* See Volume I, page 346.

## BLEACHING POWDER OR CHLORIDE OF LIME. CALCIUM HYPOCHLORITE.

Chloride of lime is a white powder smelling of chlorine, which should be free from any lumps. On exposure to the air, it absorbs moisture and carbon dioxide, forming then a doughy mass. Mixed with a little water, it evolves heat, and dissolves in 20 times its weight of water, a considerable residue always remaining. Chloride of lime should contain 35 to 39% active chlorine. It decomposes gradually when stored; the decomposition may even take the character of an explosion.

For preparing a solution, mix 1 part bleaching powder to a perfectly smooth paste with 3 parts water and dilute with 3 parts more of water; after settling, the pure solution is diluted to the desired strength.

Chloride of lime is used for bleaching vegetable fibres and for chloring the wool (page 72).



*Hypochlorites and bleaching solutions* (which contain hypochlorites) are determined like chloride of lime.

The following method of testing the hypochlorite liquors in the bleach-house has been proposed by R. Baur: For the titration of the bleaching liquors in use, a "thiosulphate" burette graduated into  $\frac{1}{5}$  c.c. and a "chlorine tube" are required. The latter is a glass tube about  $1\frac{1}{2}$  cm. ( $\frac{3}{5}$  inch) inside wide and 50 cm. (20 inches) long, closed at one end. Hydrochloric acid, potassium iodide and a thiosulphate solution containing 6.95 grms. sodium thiosulphate in 1 litre water are used for testing. This solution, each c.c. of which corresponds to 1 mg. (0.001 grm.) of active chlorine, is filled into the "thiosulphate burette". The "chlorine tube" is filled with 10 c.c. of the old chlorine liquor from the bleach-house, and a few c.c. of solution of potassium iodide are added until, on gently shaking, the liquor no longer becomes brown or turbid. When this point has been reached, a few c.c. of hydrochloric acid are added, until the turbid liquor has become quite clear (brown). The thiosulphate solution is now added, pretty quickly at first and then drop by drop, until the colour, which on moderate shaking had gradually turned a paler yellow, suddenly disappears. Each c.c. of sodium thiosulphate solution added indicates 1 mg. (0.001 grm.) of active chlorine in 10 c.c. of bleaching liquor.

### **SODIUM HYPOCHLORITE. HYPOCHLORITE OF SODA. EAU DE JAVELLE.**

Sodium hypochlorite is known only in the form of its aqueous solution, which is produced either by the electrolysis of common salt or by mixing the solutions of chloride of lime and soda.

100 lbs chloride lime 33% are mixed with 40 gallons water, and 60 lbs soda ash are dissolved in 20 gallons boiling water and diluted with 10 gallons cold water. The soda solution is added to the paste of chloride of lime, and the mixture stirred for  $\frac{1}{2}$  hour and allowed to settle overnight. The clear solution is drawn off and the precipitate washed 4 or 5 times with a small quantity of cold water, and allowed to settle again, the clear liquid being added to the lot from the first precipitation and the whole being brought with cold water to about 150 gallons of 6—7° Tw. It may be freed entirely from lime by the addition of 1—2 lbs soda ash.

Hypochlorite of soda, like chloride of lime, is used for bleaching vegetable fibres, but is not suitable for chloring the wool. As compared with chloride of lime, it offers the advantage that it can be easily obtained in form of a clear solution, free from lime.

### SULPHUR.

Sulphur is marketed either as sulphur in sticks, in large pieces, or as a crystalline powder in the shape of sublimated sulphur (flowers of sulphur).

It melts at  $114.5^{\circ}$  C. ( $238.1^{\circ}$  F.), and sublimates and evaporates at higher temperatures. If ignited or if heated when exposed to the air, it burns with a blue flame not giving much light, forming sulphur dioxide gas usually known as "sulphurous acid".

The bleaching effect of sulphur on wool and silk is due to the formation of this gas originating when burning the sulphur in stoving chambers. The burning of the sulphur should be so regulated as to prevent heat developing in excess and to thus avoid the sublimating of sulphur on the goods. The sulphur when used for bleaching or stoving is best ignited by means of red-hot iron or coal.

### HYDROGEN PEROXIDE OR PEROXIDE OF HYDROGEN.

Hydrogen peroxide is used as a colourless aqueous solution prepared by the action of dilute sulphuric acid on barium peroxide, or sometimes sodium peroxide. The action of hydrogen peroxide is based on its property to readily develop oxygen, and it is therefore used for bleaching. The strength of the commercial solution is usually expressed in volumes of oxygen evolved by 1 volume of the liquid, the usual strength of 12 volumes corresponding to 3% hydrogen peroxide.

The product keeps best at a low temperature, in the dark and if acidulated with small quantities of acid. An addition of  $1\frac{1}{2}$  oz naphtalene or 1 pint of alcohol or ether to 10 gallons of the solution improves its stability. In the presence of alkalies or on heating, it readily gives off the oxygen it contains, and as certain metals have a decomposing effect on hydrogen peroxide, it is best to keep it in well-tarred casks or in carboys.

Hydrogen peroxide is used for bleaching the various kinds of fibres, particularly silk, tussah silk and wool.

### SODIUM PEROXIDE

is a white deliquescent powder which absorbs carbon dioxide with the evolution of oxygen. It dissolves in

water with generation of heat, and on boiling develops oxygen. On sufficiently cooling, it dissolves in acidulated water forming hydrogen peroxide and the corresponding sodium salt. It is frequently employed therefore in place of the latter for bleaching. When brought into contact with inflammable substances, like paper etc., it ignites them, and as it is moreover apt to decompose with a detonation without any apparent cause, it should be handled with care.

Sodium peroxide develops 20 per cent by weight of oxygen, whereas hydrogen peroxide of 12 per cent by volume only yields  $1\frac{1}{2}$  per cent by weight of oxygen. In addition, sodium peroxide possesses the advantage of remaining stable for an indefinite period when properly stored.

Sodium peroxide is used for the same purposes as hydrogen peroxide.

### **POTASSIUM PERMANGANATE OR PERMANGANATE OF POTASH.**

Brilliant steel-blue, well-nigh black, crystals which dissolve in 15 to 16 times their weight of cold water, with an intensely blue-red colour.

Permanganate of potash is a very strong oxidising agent, and for this reason is applied sometimes also for bleaching purposes (see page 51); the brown precipitate of manganese peroxide which forms on the goods is very easily dissolved and removed by sulphurous acid or an acidulated solution of bisulphite.

### **HYRALDITE.**

Hyraldite is a stable formaldehyde compound of hydrosulphite, and serves for discharging and also for stripping (see page 44).

It is marketed in the following brands:

Hyraldite A  
Hyraldite C extra  
Hyraldite Special  
Hyraldite W  
Hyraldite CW extra  
Hyraldite Z for Stripping  
Hyraldite Z soluble conc.

Hyraldite A, C extra und Special are easily soluble in water; the "W" brands are partially soluble. Hyraldite Z for Stripping is insoluble in water and keeps exceedingly well. Hyraldite should be kept in a cool place in closed vessels.

*Hyraldite A* and the double strength brand *Hyraldite C extra* serve for discharging and also for stripping. *Hyraldite Z for stripping* and *Z soluble conc.* are used especially for stripping; the other brands are used for discharging purposes only.

For particulars about *discharging* see Volume IV.

The stripping is best done in wooden vessels, as iron and copper are very apt to cause spots on the goods. It is well to remove any metal steam-coils before entering the goods or to wrap them round with cotton cloth. Prepare a bath at 40—50° C. (105—120° F.), to which add

2 —4 %	Hyraldite Z for Stripping	} of the weight of the goods
2.5—5.5 %	formic acid 85% or	
1 —2 %	sulphuric acid	
or		
2 —4 %	Hyraldite Z soluble conc.	} of the weight of the goods;
1 —2 %	formic acid 85%	

enter the goods, raise gradually to the boil in the course of  $\frac{1}{2}$  to  $\frac{3}{4}$  hour, and boil for 20 to 30 minutes. Hereafter rinse well in cold and also to advantage in warm water. Instead of the afore-named two brands, Hyraldite A or C extra may be used, as follows:

5—10% A or 2.5—5% C extra with  
5—10% acetic acid 30%, or bisulphite 62½° Tw.

## SOAP.

Soaps are usually classed as hard or soda soaps, and soft or potash soaps. The latter practically all contain impurities from the raw materials, for instance excess alkali and glycerine, and are therefore only used where these impurities cannot have any injurious effect and where the unpleasant smell they leave on the goods does not signify.

Hard soaps are purified soaps, frequently but very imperfectly freed from excess alkali and glycerine.

Frequently the soaps are prepared in textile works by boiling oleïne (crude oleic acid) with soda lye according to the following recipe:

30 lbs	oleïne
12 lbs	caustic soda lye of 77° Tw.
16 gallons	water.

The lye is boiled up with one-half of the water, and the oleïne is added gradually with continuous stirring. When no lumps of soap are left, the other half of the water is added, stirring being continued for at least another hour. For rendering the combination of the oleïne and the lye complet prolonged boiling is essential.

A good hard soap must possess the following properties: It must contain a high percentage of soap proper, i. e. alkali salts of fatty acids, and be free or fairly free from unsaponified fat, alkali, common salt, glycerine and other impurities such as silicate of potash, starch, clay, etc. No hard and fast rules can however be given regarding the composition of the soaps, which is very variable. Generally, good qualities of soap should contain approximately:

60—70%	fatty acid
6—8%	alkali, calculated as caustic soda
20—30%	water.

An exact valuation of the soap can be carried out by chemical analysis only. In order to determine approximately the quantity of the free alkali, 10 grms of the soap are dissolved in hot, pure alcohol, filtered, and tested with phenol phtaleïne solution. If the solution turns red, this indicates the presence of free caustic alkali, although slight quantities are not enough to produce a red colouration. The solution may be titrated with acid to determine the amount of free alkali present. Any soda present will remain on the filter, likewise most of the adulterations that come into consideration.

### TURKEY-RED OIL.

Turkey-red oil is prepared by treating castor-oil with sulphuric acid, and is marketed in the form of an oily liquid easily soluble in water containing caustic soda lye or ammonia. It contains approximately 50—65% of Turkey-red oil. A good quality should contain at least 50% Turkey-red oil. It is used for various purposes in dyeing, amongst others for the levelling of shades. As

compared with soap, it has the advantage of being less apt to form precipitates in calcareous water.

### **UNIVERSAL OIL. MONOSOLVOL. AVIROL. MONOPOLE SOAP.**

Under these and other denominations, various preparations soluble in water are marketed in a liquid or solid form, which are all in character similar to Turkey-red oil; they are distinguished especially by their property of being but slightly sensitive to lime, and in this respect superior to Turkey-red oil. They are less apt to form precipitates with lime and magnesia salts and have the property to re-dissolve lime or magnesia soaps that may have formed. These products are not decomposed by the quantities of common salt or acids customary in dyeing and finishing. Owing to these properties they are used extensively and in large quantities for dyeing and finishing, as substitutes for Turkey-red oil. In the wool-dyeing trade they are used a great deal in quantities of 2—3%, reckoned on the weight of the goods, as an addition in dyeing Acid Colours and Chrome Colours with a view to promoting the levelness of the shades and preserve the soft handle of the wool.

### **TETRAPOL. NETTOLAVOL. OXYVOL.**

These are mixtures of tetrachloride of carbon and soaps soluble in water, which bring into use the property of tetrachloride of carbon to dissolve fat and oil in aqueous baths also. Exceedingly well suited for removing spots and thoroughly removing non-saponifiable fats and oils from wool, especially from fabrics and yarns. When scouring impure goods, about  $\frac{1}{2}$ —1 lb tetrapol may for instance be added for a piece of 50—60 lbs weight, the goods otherwise being worked in the usual manner.

### **BOILED-OFF LIQUOR.**

Boiled-off liquor is the name for soap liquors which have been used for the degumming of silk and which thus contain some gum from the silk in addition to the soap. This boiled-off liquor is a favourite addition to the dyebaths intended for dyeing silk, as in such bath brighter shades are obtained and the dyestuffs go more evenly on to the silk than in the ordinary aqueous bath. Contrary to acidified soap baths, the boiled-off liquor when acidified until showing a weakly acid or neutral reaction, is of an even mucillaginous condition. As boiled-off liquor is very

apt to become putrid, it is not a regular article of trade, and dye houses which to not produce boiled-off liquor in sufficient quantities for their purposes prepare substitutes which may for instance be produced according to the following recipe:

3 lbs soap, 10 oz gelatine or glue, 3—4 oz olive-oil and 3—4 oz common salt are boiled up well with 10 gallons water. This solution is used in the same way as boiled-off liquor. For acidifying this substitute, the requisite sulphuric or acetic acid should be added but slowly whilst continually stirring.

### TANNINS.

This group comprises a number of organic acids derived from the vegetable kingdom, which are all similar in their chemical character, and are distinguished in general by their properties to convert the animal skin into leather, to precipitate albumen and glue, alkaloids and Basic Colours from their solutions, and together with ferric acetate to yield blue-black or dark green precipitates; other distinguishing features are their strong astringent taste and their feebly acid reactions towards litmus as also their strong reducing power.

In the dye-house the tannins are principally used on account of their property to yield insoluble compounds with certain metallic oxides and dyestuffs as mordants and weighting agents. (Cutch and Gambier also belong to the group of tannins.)

The tannins are usually coloured to some extent and consequently impart a yellowish or brownish tone to the goods treated with them. For the production of light and brilliant shades, tannic acid is therefore used principally, which is the purest and the least coloured of the tannins, as also decoctions of gall-nuts and decolourised sumac extract, whereas for deeper shades leaf-sumac, ordinary sumac extracts, myrobalans, knoppern, valonias, etc. are given the preference as being cheaper.

The tannins which are most important in the dye-house are the following:

1. *Tannic Acid*, or *Gallo-Tannic Acid*. Tannic acid is found in many parts of plants holding tannin, particularly in gall-nuts and in the pure sumac (from *Rhus coriaria*). and is obtained principally from the gall-nuts in Eastern Asia, which are very rich in tannic acid.



It is marketed in the form of a light-coloured powder or of yellowish to brownish scales, or again as a brittle glassy substance of a brownish colour, or as a spongy mass. When exposed to the air, it gradually becomes darker. It dissolves in 6 times its weight of cold water, and more easily so in hot water; in dilute alcohol, dilute acetic acid or glycerine it dissolves very freely. The aqueous solution decomposes gradually when left standing. Alkaline solutions become strongly discoloured.

The better kinds of commercial tannic acid contain about 65—85% tannin. Good tannic acid yields a clear solution in water or in alcohol containing water, and on being reduced to ashes leaves but little residue. There are however very efficient qualities on the market which do not yield a perfectly clear solution in water. Pure gallo-tannic acid yields a clear solution in a mixture of equal parts of alcohol and ether, while most of the impurities and adulterations — gallic acid excepted — are not dissolved thereby.

2. *Gall-nuts* or *Galls* are ball-shaped abnormal growths caused by the sting of insects when depositing their eggs; they should be collected before they have been pierced by the young insect. Of the oak gall-nuts, the green or black Aleppo and Levante gall-nuts are the best, which contain about 55—60% gallo-tannic acid. The Hungarian, Italian, French and German gall-nuts are very much poorer in tannic acid. The Chinese and Japanese galls contain up to about 80% gallo-tannic acid and are used principally for the manufacture of pure tannic acid and for weighting silk.

3. *Sumac*. Next to pure tannic acid, sumac is the tannin most generally used in dyeing. The sumac from *rhus coriaria* is the best, and contains gallo-tannic acid. The finest quality, and at the same time the least coloured, is the Sicilian sumac; next to it comes American sumac, which has gained greatly in quality during recent years, as well as the Greek, Spanish and Portuguese sumac. Of less value are the sumacs from *coriaria myrtifolia* and *rhus cotinus* obtained in Hungary, the Tyrol and the Provence.

Commercial sumac usually consists of the whole, broken-up, or sometimes also powdered leaves of the plant; the stalks of the leaves are very often mixed up with the



rest. The good kinds have an olive-green colour and a fresh, agreeable smell; they contain 15—20%, even sometimes more than 20% tannin. Sumacs, which are dull in colour and have a musty smell, have deteriorated by moisture and too long storing.

Sumac is used principally as a tannin for dark shades; the dull red colour which the sumac contains usually interferes rather with light and brilliant shades.

*Sumac Extract* is sold as a thick dark brown liquid of about 52° Tw. or in a solid state. Decolourised sumac extracts may, as a rule replace the tannic acid, even for bright shades.

Liquid sumac extract is rather apt to ferment, losing thereby in strength.

4. *Myrabolans* are the fruit of various Chinese and East Indian plants which are marketed in a dry state and in powder form. They contain about 25—45% ellagitannic acid and also a yellow-brown dyestuff. It is sometimes used for black dyeing of the cotton warp in half-wool pieces, and for covering burls.

5. *Chestnut Extract* is derived from the wood of the chestnut-oak which contains about 8—10% of a tannin substance the nature of which is not fully known. The solid extract possesses a shining black colour; in the liquid state it represents a brown syrup. The extracts become turbid when diluted, and separate brown substances, so-called "phlobaphenes", which apparently take an active part in some way in the weighting and dyeing process.

Chestnut extract is the most important tannin matter for weighting and dyeing of black silk.

The above tannins, as also several others, are used largely for dyeing cotton and for weighting silk, more particularly black silk.

The *value of the tannins* varies a good deal according to the amount of tannic acid they contain; it is immaterial in estimating their value whether they contain gallo-tannic or ellagitannic acid. For many purposes the amount of colouring matter contained in the tannins is likewise a consideration. When stored for a prolonged time, principally in damp, close places, the tannins are deteriorated through the decomposition of the tannic acid.

The value of the tannins is best determined by an exact titration with permanganate and by making dye-tests.

For *testing by dyeing*, dissolve carefully weighed quantities of the tannin to be tested and of the quality with which it is to be compared (of pure tannic acid about 0.3 gm.) in hot water. Fill up with water up to 250 cc. add 10 grms. common salt and  $2\frac{1}{2}$  cc. glacial acetic acid (or about 5 cc. good acetic acid) in each vessel, and mordant therein 10 grms. of cotton yarn, previously well boiled, for 3 hours, the liquid meanwhile being allowed to cool off; then wring off each hank by itself, without however rinsing, and turn them in a glass containing 200 cc. nitrate or pyrolignite of iron of  $1\frac{1}{2}$ —3° Tw. for 15 to 20 minutes, rinse and dry; the strength of the tannin is then determined from the depth of the shade of the cotton.

In order to determine whether the material is suited for light shades, fix it with antimony instead of iron salts, and dye with Basic Colours, for instance New Methylene Blue GG or Irisamine G; it will then be found that one tannin is sometimes more suited for blue, and another more for red shades.

# THERMOMETER TABLES.

## COMPARISON OF THE THERMOMETER TABLES OF CELSIUS OR CENTIGRADE, FAHRENHEIT AND RÉAUMUR.

Degrees			Degrees			Degrees		
Celsius	Fahren- heit	Réau- mur	Celsius	Fahren- heit	Réau- mur	Celsius	Fahren- heit	Réau- mur
0	32.0	0.0	34	93.2	27.2	68	154.4	54.4
1	33.8	0.8	35	95.0	28.0	69	156.2	55.2
2	35.6	1.6	36	96.8	28.8	70	158.0	56.0
3	37.4	2.4	37	98.6	29.6	71	159.8	56.8
4	39.2	3.2	38	100.4	30.4	72	161.6	57.6
5	41.0	4.0	39	102.2	31.2	73	163.4	58.4
6	42.8	4.8	40	104.0	32.0	74	165.2	59.2
7	44.6	5.6	41	105.8	32.8	75	167.0	60.0
8	46.4	6.4	42	107.6	33.6	76	168.8	60.8
9	48.2	7.2	43	109.4	34.4	77	170.6	61.6
10	50.0	8.0	44	111.2	35.2	78	172.4	62.4
11	51.8	8.8	45	113.0	36.0	79	174.2	63.2
12	53.6	9.6	46	114.8	36.8	80	176.0	64.0
13	55.4	10.4	47	116.6	37.6	81	177.8	64.8
14	57.2	11.2	48	118.4	38.4	82	179.6	65.6
15	59.0	12.0	49	120.2	39.2	83	181.4	66.4
16	60.8	12.8	50	122.0	40.0	84	183.2	67.2
17	62.6	13.6	51	123.8	40.8	85	185.0	68.0
18	64.4	14.4	52	125.6	41.6	86	186.8	68.8
19	66.2	15.2	53	127.4	42.4	87	188.6	69.6
20	68.0	16.0	54	129.2	43.2	88	190.4	70.4
21	69.8	16.8	55	131.0	44.0	89	192.2	71.2
22	71.6	17.6	56	132.8	44.8	90	194.0	72.0
23	73.4	18.4	57	134.6	45.6	91	195.8	72.8
24	75.2	19.2	58	136.4	46.4	92	197.6	73.6
25	77.0	20.0	59	138.2	47.2	93	199.4	74.4
26	78.8	20.8	60	140.0	48.0	94	201.2	75.2
27	80.6	21.6	61	141.8	48.8	95	203.0	76.0
28	82.4	22.4	62	143.6	49.6	96	204.8	76.8
29	84.2	23.2	63	145.4	50.4	97	206.6	77.6
30	86.0	24.0	64	147.2	51.2	98	208.4	78.4
31	87.8	24.8	65	149.0	52.0	99	210.2	79.2
32	89.6	25.6	66	150.8	52.8	100	212.0	80.0
33	91.4	26.4	67	152.6	53.6			

COMPARISON OF HYDROMETER DEGREES TWADDLE AND BAUME  
WITH THE SPECIFIC GRAVITIES FOR LIQUIDS HEAVIER  
THAN WATER.

Degrees Twaddle	De- grees Baumé	Spec. Gravity	Degrees Twaddle	De- grees Baumé	Spec. Gravity	Degrees Twaddle	De- grees Baumé	Spec. Gravity
1	0.7	1.005	58	32.4	1.290	116	53.0	1.580
2	1.4	1.010	60	33.3	1.300	118	53.6	1.590
4	2.7	1.020	62	34.2	1.310	120	54.1	1.600
6	4.1	1.030	64	35.0	1.320	122	54.7	1.610
8	5.4	1.040	66	35.8	1.330	124	55.2	1.620
10	6.7	1.050	68	36.6	1.340	126	55.8	1.630
12	8.0	1.060	70	37.4	1.350	128	56.3	1.640
14	9.4	1.070	72	38.2	1.360	130	56.9	1.650
16	10.6	1.080	74	39.0	1.370	132	57.4	1.660
18	11.9	1.090	76	39.8	1.380	134	57.9	1.670
20	13.0	1.100	78	40.5	1.390	136	58.4	1.680
22	14.2	1.110	80	41.2	1.400	138	58.9	1.690
24	15.4	1.120	82	42.0	1.410	140	59.5	1.700
26	16.5	1.130	84	42.7	1.420	142	59.9	1.710
28	17.7	1.140	86	43.4	1.430	144	60.4	1.720
30	18.8	1.150	88	44.1	1.440	146	60.9	1.730
32	19.8	1.160	90	44.8	1.450	148	61.4	1.740
34	20.9	1.170	92	45.4	1.460	150	61.8	1.750
36	22.0	1.180	94	46.1	1.470	152	62.3	1.760
38	23.0	1.190	96	46.8	1.480	154	62.8	1.770
40	24.0	1.200	98	47.4	1.490	156	63.2	1.780
42	25.0	1.210	100	48.1	1.500	158	63.7	1.790
44	26.0	1.220	102	48.7	1.510	160	64.2	1.800
46	26.9	1.230	104	49.4	1.520	162	64.6	1.810
48	27.9	1.240	106	50.0	1.530	164	65.0	1.820
50	28.8	1.250	108	50.6	1.540	166	65.5	1.830
52	29.7	1.260	110	51.2	1.550	168	65.9	1.840
54	30.6	1.270	112	51.8	1.560	169	66.1	1.845
56	31.5	1.280	114	52.4	1.570	170	66.3	1.850

Note:

The degrees in Twaddle's hydrometer bear a direct relationship to the specific gravity and may be obtained from the same by the following formula in which d represents the specific gravity and n the number of degrees Twaddle:  $n = \frac{1000 d - 1000}{5}$ . On the other hand by

the formula  $d = \frac{5 n + 1000}{1000}$  the degrees Twaddle are converted into the corresponding specific gravity. For values below 2.0 the degrees Twaddle may also be obtained from the specific gravity by moving the decimal point two figures to the right, striking off the first figure and multiplying the rest by 2, as per the following example:

Specific gravity 1.133:  
113.3:  
13.3  $\times 2$  :  
26.6° Twaddle.

COMPARISON OF HYDROMETER DEGREES BAUMÉ WITH THE SPECIFIC GRAVITY OF LIQUIDS LIGHTER THAN WATER.

Degrees Baumé	Spec. Gravity	Degrees Baumé	Spec. Gravity	Degrees Baumé	Spec. Gravity	Degrees Baumé	Spec. Gravity
11	0.993	16	0.960	21	0.930	26	0.901
12	0.987	17	0.954	22	0.924	27	0.896
13	0.980	18	0.948	23	0.918	28	0.890
14	0.973	19	0.942	24	0.913	29	0.885
15	0.967	20	0.936	25	0.907	30	0.880

WEIGHTS AND MEASURES.

I. METRIC SYSTEM.

- 1 metre (m) = 10 decimetres (dm) = 100 centimetres (cm) = 1000 millimetres [(mm)].  
 1 litre (l) = 1000 cubic centimetres (cc. or ccm). 1 cubic metre (cbm) = 1000 litres.  
 1 gramme (g or gr or grm) = 10 decigrammes (dg) = 100 centigrammes (cg) = 1000 milligrammes (mg).  
 1 kilogramme (kg or kilo) = 1000 grammes.  
 1000 kilogrammes = 1 ton (t) i. e. metric ton.  
 100 kilogrammes = 1 metric centner or quintal.  
 50 kilogrammes = 1 centner (or nearly 1 hundredweight).  
 10 grammes = 1 dekagramme (deka or dg). 100 grammes = 1 hectogramme (hg).

The gramme is the standard unit of weight of the metric system, and is equal to the weight of 1 cubic centimetre of pure water (measured whilst at its greatest density, in vacuum under a latitude of 45 degrees, at sea level). Hence the following relations of weights and measures are obtained:

- 1 cubic centimetre water = 1 gramme.  
 1 litre " = 1 kilogramme.  
 1 cubic metre " = 1 ton (metric ton).

II. ENGLISH WEIGHTS AND MEASURES.

- 1 yard (yd) = 3 feet. 1 foot (') = 12 inches ("). 1 inch = 12 lines (""').  
 1 yard = 91.44 centimetres. 1 foot = 30.48 centimetres. 1 inch = 2.54 centimetres.  
 1 metre = 1.094 yard = 3.281 feet = 39.37 inches.  
 1 Imperial gallon (gall.) = 4 quarts (qts) = 8 pints (pts) = 32 gills.  
 1 Imperial gallon = 4.544 litres. 1 litre = 0.220 Imperial gallon.  
 1 pint = 0.568 litre. 1 litre = 1.76 pints.

In England by the term gallon (gall.) the Imperial gallon is meant, whilst in the United States of America the considerably smaller apothecary's or wine gallon is usually understood by this term. In England the ton or gross ton of 2240 lbs is also exclusively in use, whilst in the United States the term "ton"

may refer either to the gross ton of 2240 lbs or the short ton of 2000 lbs avoirdupois. The weights and measures used in this book always refer to the Imperial gallon, and to the gross ton of 2240 lbs.

- 1 wine gallon = 4 quarts = 8 pints.
- 1 wine gallon = 3.785 litres. 1 litre = 0.264 wine gallon.
- 1 pint (apothecary's measure) = 0.473 litre. 1 litre = 2.114 pints (apothecary's measure).
- 1 Imperial gallon = 1.2 wine gallon. 1 wine gallon = 0.8335 Imperial gallon.
- 1 pound avoirdupois (lb) = 16 ounces (oz) = 256 drachms (drm.)
- 1 pound avoirdupois = 7000 Troy grains (gr).
- 1 ton (gross ton) = 20 hundredweights (cwt) = 2240 lbs.
- 1 hundredweight = 4 quarters (28 lbs each) = 112 lbs.
- 1 ton = 1016 kilogrammes. 1 pound avoirdupois = 453.593 grammes.
- 1 ounce = 28.349 grammes. 1 Troy grain = 0.065 gramme.
- 1 kilogramme = 2.205 lbs avoirdupois. 1 gramme = 15.434 Troy grains.
- 1 Imperial gallon holds 10 pounds avoirdupois or 70 000 grains water (measured at 62° F. under a barometric pressure of 30 inches).
- 1 wine gallon holds only 8.35 lbs water.

### III. RUSSIAN WEIGHTS AND MEASURES.

- 1 sagèn = 3 arshin = 7 feet.
- 1 foot = 12 inches. 1 arshin = 16 vershock.
- 1 foot = 30.48 centimetres. 1 inch = 2.54 centimetres. 1 Russian foot or inch equal to 1 English foot or inch respectively.
- 1 arshin = 71.12 centimetres. 1 vershock = 4.45 centimetres.
- 1 metre = 3.28 feet = 39.37 inches = 1.41 arshin = 22.50 vershock.
- 1 vedro = 8 stof = 12 quart = 30 krushkl.
- 1 vedro = 12.30 litres. 1 stof = 1.54 litre. 1 quart = 1.02 litre.
- 1 litre = 0.0813 vedro = 0.9756 quart.
- 1 pood = 40 pounds (Russian). 1 pound = 32 lot = 96 solotnik.
- 1 pood = 16.38 kilogrammes. 1 kilogramme = 0.06 pood.
- 1 pound (Russian) = 409.51 grammes. 1 lot = 12.48 grammes. 1 solotnik = 4.16 grammes.
- 1 kilogramme = 2.44 pounds (Russian).

In Russian Poland the following weights and measures are used:

- 1 ell = 2 feet = 0.81 arshin = 12.96 vershock.
- 1 foot = 12 inches = 0.945 Russian foot = 11.34 Russian inches.
- 1 ell = 57.6 centimetres. 1 foot = 28.8 centimetres.
- 1 pound = 32 lots = 0.99 Russian pound = 405.50 grammes.
- 1 centner = 4 stone = 100 pounds = 2.476 pud.

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## PERCENTAGE TABLES.

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# PERCENTAGE TABLES

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This table provides the practical dyer with a convenient and exact method of converting percentages of colour into avoirdupois.

The following may serve as an example:

If 60 lbs of material are to be dyed with 1.69<sup>0</sup>/<sub>0</sub> of colour, proceed as follows:

For 10 lbs, 1 <sup>0</sup>/<sub>0</sub> equals 1 oz 263 grains

“ 50 “ 1 <sup>0</sup>/<sub>0</sub> “ 8 oz

---

For 60 lbs, 1 <sup>0</sup>/<sub>0</sub> equals 9 oz 263 grains      9 oz 263 grains

For 10 lbs, 0.69<sup>0</sup>/<sub>0</sub> equals 1 oz 46 grains

“ 50 “ 0.69<sup>0</sup>/<sub>0</sub> “ 5 oz 228 grains

---

For 60 lbs, 0.69<sup>0</sup>/<sub>0</sub> equals 6 oz 274 grains      6 oz 274 grains

1.69<sup>0</sup>/<sub>0</sub>

15 oz 537 grains

or 1 lb 99 grains

---





PERCENTAGE TABLES.

Per Cent	For 10 Lbs	For 50 Lbs	For 100 Lbs
10 %	1 lb.	5 lbs.	10 lbs.
9 %	14 oz. 175 grains	4 1/2 lbs.	9 lbs.
8 %	12 oz. 350 grains	4 lbs.	8 lbs.
7 %	11 oz. 87 grains	3 1/2 lbs.	7 lbs.
6 %	9 oz. 263 grains	3 lbs.	6 lbs.
5 %	8 oz.	2 1/2 lbs.	5 lbs.
4 %	6 oz. 175 grains	2 lbs.	4 lbs.
3 %	4 oz. 350 grains	1 1/2 lbs.	3 lbs.
2 %	3 oz. 88 grains	1 lb.	2 lbs.
1 %	1 oz. 263 grains	8 oz.	1 lb.
0.99	1 oz. 256 grains	7 oz. 403 grains	15 oz. 368 grains
0.98	1 oz. 249 grains	7 oz. 368 grains	15 oz. 298 grains
0.97	1 oz. 242 grains	7 oz. 333 grains	15 oz. 228 grains
0.96	1 oz. 235 grains	7 oz. 298 grains	15 oz. 158 grains
0.95	1 oz. 228 grains	7 oz. 263 grains	15 oz. 88 grains
0.94	1 oz. 221 grains	7 oz. 228 grains	15 oz. 18 grains
0.93	1 oz. 214 grains	7 oz. 193 grains	15 oz. 385 grains
0.92	1 oz. 207 grains	7 oz. 158 grains	14 oz. 315 grains
0.91	1 oz. 200 grains	7 oz. 123 grains	14 oz. 245 grains
0.90	1 oz. 193 grains	7 oz. 88 grains	14 oz. 175 grains
0.89	1 oz. 186 grains	7 oz. 53 grains	14 oz. 105 grains
0.88	1 oz. 179 grains	7 oz. 18 grains	14 oz. 35 grains
0.87	1 oz. 172 grains	6 oz. 420 grains	13 oz. 403 grains
0.86	1 oz. 165 grains	6 oz. 385 grains	13 oz. 333 grains
0.85	1 oz. 158 grains	6 oz. 350 grains	13 oz. 263 grains
0.84	1 oz. 151 grains	6 oz. 315 grains	13 oz. 193 grains
0.83	1 oz. 144 grains	6 oz. 280 grains	13 oz. 123 grains
0.82	1 oz. 137 grains	6 oz. 245 grains	13 oz. 53 grains
0.81	1 oz. 130 grains	6 oz. 210 grains	12 oz. 420 grains
0.80	1 oz. 123 grains	6 oz. 175 grains	12 oz. 350 grains
0.79	1 oz. 116 grains	6 oz. 140 grains	12 oz. 280 grains
0.78	1 oz. 109 grains	6 oz. 105 grains	12 oz. 210 grains
0.77	1 oz. 102 grains	6 oz. 70 grains	12 oz. 140 grains
0.76	1 oz. 95 grains	6 oz. 35 grains	12 oz. 70 grains
0.75	1 oz. 88 grains	6 oz.	12 oz.
0.74	1 oz. 81 grains	5 oz. 403 grains	11 oz. 368 grains
0.73	1 oz. 74 grains	5 oz. 368 grains	11 oz. 298 grains
0.72	1 oz. 67 grains	5 oz. 333 grains	11 oz. 228 grains
0.71	1 oz. 60 grains	5 oz. 298 grains	11 oz. 158 grains
0.70	1 oz. 53 grains	5 oz. 263 grains	11 oz. 88 grains

PERCENTAGE TABLES.

Per Cent	For 10 Lbs	For 50 Lbs	For 100 Lbs
0.69	1 oz. 46 grains	5 oz. 228 grains	11 oz. 18 grains
0.68	1 oz. 39 grains	5 oz. 193 grains	10 oz. 385 grains
0.67	1 oz. 32 grains	5 oz. 158 grains	10 oz. 315 grains
0.66	1 oz. 25 grains	5 oz. 123 grains	10 oz. 245 grains
0.65	1 oz. 18 grains	5 oz. 88 grains	10 oz. 175 grains
0.64	1 oz. 11 grains	5 oz. 53 grains	10 oz. 105 grains
0.63	1 oz. 4 grains	5 oz. 18 grains	10 oz. 35 grains
0.62	434 grains	4 oz. 420 grains	9 oz. 403 grains
0.61	427 grains	4 oz. 385 grains	9 oz. 333 grains
0.60	420 grains	4 oz. 350 grains	9 oz. 263 grains
0.59	413 grains	4 oz. 315 grains	9 oz. 193 grains
0.58	406 grains	4 oz. 280 grains	9 oz. 123 grains
0.57	399 grains	4 oz. 245 grains	9 oz. 53 grains
0.56	392 grains	4 oz. 210 grains	8 oz. 420 grains
0.55	385 grains	4 oz. 175 grains	8 oz. 350 grains
0.54	378 grains	4 oz. 140 grains	8 oz. 280 grains
0.53	371 grains	4 oz. 105 grains	8 oz. 210 grains
0.52	364 grains	4 oz. 70 grains	8 oz. 140 grains
0.51	357 grains	4 oz. 35 grains	8 oz. 70 grains
0.50	350 grains	4 oz.	8 oz.
0.49	343 grains	3 oz. 403 grains	7 oz. 368 grains
0.48	336 grains	3 oz. 368 grains	7 oz. 298 grains
0.47	329 grains	3 oz. 333 grains	7 oz. 228 grains
0.46	322 grains	3 oz. 298 grains	7 oz. 158 grains
0.45	315 grains	3 oz. 263 grains	7 oz. 88 grains
0.44	308 grains	3 oz. 228 grains	7 oz. 18 grains
0.43	301 grains	3 oz. 193 grains	6 oz. 385 grains
0.42	294 grains	3 oz. 158 grains	6 oz. 315 grains
0.41	287 grains	3 oz. 123 grains	6 oz. 245 grains
0.40	280 grains	3 oz. 88 grains	6 oz. 175 grains
0.39	273 grains	3 oz. 53 grains	6 oz. 105 grains
0.38	266 grains	3 oz. 18 grains	6 oz. 35 grains
0.37	259 grains	2 oz. 420 grains	5 oz. 403 grains
0.36	252 grains	2 oz. 385 grains	5 oz. 333 grains
0.35	245 grains	2 oz. 350 grains	5 oz. 263 grains
0.34	238 grains	2 oz. 315 grains	5 oz. 193 grains
0.33	231 grains	2 oz. 280 grains	5 oz. 123 grains
0.32	224 grains	2 oz. 245 grains	5 oz. 53 grains
0.31	217 grains	2 oz. 210 grains	4 oz. 420 grains
0.30	210 grains	2 oz. 175 grains	4 oz. 350 grains

PERCENTAGE TABLES.

Per Cent	For 10 Lbs	For 50 Lbs	For 100 Lbs
0.29	203 grains	2 oz. 140 grains	4 oz. 280 grains
0.28	196 grains	2 oz. 105 grains	4 oz. 210 grains
0.27	189 grains	2 oz. 70 grains	4 oz. 140 grains
0.26	182 grains	2 oz. 35 grains	4 oz. 70 grains
0.25	175 grains	2 oz.	4 oz.
0.24	168 grains	1 oz. 403 grains	3 oz. 368 grains
0.23	161 grains	1 oz. 368 grains	3 oz. 298 grains
0.22	154 grains	1 oz. 333 grains	3 oz. 228 grains
0.21	147 grains	1 oz. 298 grains	3 oz. 158 grains
0.20	140 grains	1 oz. 263 grains	3 oz. 88 grains
0.19	133 grains	1 oz. 228 grains	3 oz. 18 grains
0.18	126 grains	1 oz. 193 grains	2 oz. 385 grains
0.17	119 grains	1 oz. 158 grains	2 oz. 315 grains
0.16	112 grains	1 oz. 123 grains	2 oz. 245 grains
0.15	105 grains	1 oz. 88 grains	2 oz. 175 grains
0.14	98 grains	1 oz. 53 grains	2 oz. 105 grains
0.13	91 grains	1 oz. 18 grains	2 oz. 35 grains
0.12	84 grains	420 grains	1 oz. 403 grains
0.11	77 grains	385 grains	1 oz. 333 grains
0.10	70 grains	350 grains	1 oz. 263 grains
0.09	63 grains	315 grains	1 oz. 193 grains
0.08	56 grains	280 grains	1 oz. 123 grains
0.07	49 grains	245 grains	1 oz. 53 grains
0.06	42 grains	210 grains	420 grains
0.05	35 grains	175 grains	350 grains
0.04	28 grains	140 grains	280 grains
0.03	21 grains	105 grains	210 grains
0.02	14 grains	70 grains	140 grains
0.01	7 grains	35 grains	70 grains

In giving these weights, we have confined ourselves entirely to pounds, ounces and grains, leaving out drachms and scruples.

We figure:

$$1 \text{ pound} = 16 \text{ ounces} = 7000 \text{ grains}$$

$$1 \text{ ounce} = 437.5 \text{ grains.}$$

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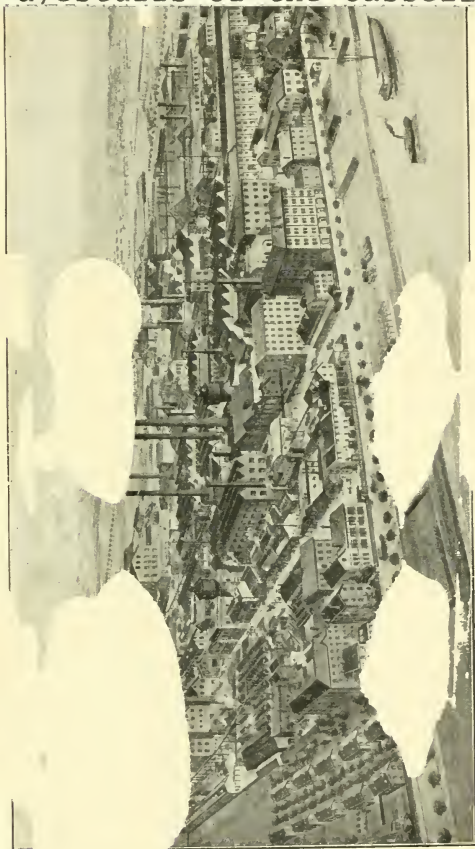
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